

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

REVISED PLAN FOR
INVESTIGATION AND SITE ASSESSMENT
FOR POTENTIAL SUBSURFACE POLLUTION
AT POWERINE OIL COMPANY REFINERY
SANTA FE SPRINGS, CALIFORNIA

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SANTA FE SPRINGS, CALIFORNIA





Project No. 850009 July, 1985



July 19, 1985

Project No.: 850009/899

Mr. Matt Stewart
President
Powerine Oil Company
12354 Lakeland Road
P.O. Box 2108
Santa Fe Springs, California 90670-9883

Dear Mr. Stewart:

Transmitted herewith are four copies of our workplan entitled, "Revised Plan for Investigation and Site Assessment for Potential Subsurface Pollution at Powerine Oil Company Refinery, Santa Fe Springs, California", to be submitted to the Los Angeles Region, California Regional Water Quality Control Board.

If you have any questions, please do not hesitate to contact either Drs. Mehran or Esmaili.

Regards,

Edward B. Sirota

Director of Technical Services

and Site Remediation

EBS:jb

Enclosures

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REVISED PLAN FOR INVESTIGATION AND SITE ASSESSMENT FOR POTENTIAL SUBSURFACE POLLUTION AT POWERINE OIL COMPANY REFINERY SANTA FE SPRINGS, CALIFORNIA

INTRODUCTION

During February, 1985, the California Regional Water Quality Control Board, Los Angeles Region, issued an order to refineries in their region to "conduct a subsurface investigation of their facilities to detect and assess any ground water pollution which may be present." The Powerine Oil Company refinery is located in the Region, in Santa Fe Springs, in an area generally bounded by Florence Avenue and Lakeland to the north and south and extending east of Norwalk Boulevard, as shown in Figure 1. In response to this order, No. 85-17, Powerine Oil Company submitted a plan to the Regional Water Quality Control Board dated May 19, 1985. This plan was determined to be inadequate by the board, which, in their letter dated June 24, 1985, specified the information that was needed to be obtained to respond to their order, No. 85-17. This plan, prepared by IT Corporation, is a revision of the previous submittal and is in response to the original order and the letter dated June 24, 1985.

In preparation of this revised workplan, additional data has been collected regarding the refinery's history and operation, and geology, hydrogeology, and ground water usage in the area. This information is presented in this workplan and would be supplemented and expanded upon in the final report.

HISTORY

A general history of Powerine Oil Company up to 1984 is shown in Exhibit 1. In brief, Powerine Oil Company took over a small foundry refinery in the late 1930's. Significant additions to the refinery were made in 1954, 1961, 1967, 1974, and 1982. Up until 1960, the refinery was a 7,000-barrel-per-day operation with distillation and some thermal cracking. In 1968, the cat cracker and alkylation unit were added and crude storage expanded so the refinery could process 27,000 barrels per day. In 1974, a new crude unit was added to the refinery, increasing capacity to 47,000 barrels per day. The last refinery expansion occurred in 1982 when the heavy oil upgrading plant, including a coking operation, coke storage, and additional tank storage capacity were added to the refinery. Since April 1984, the refinery has been closed except for some product storage and maintenance of existing equipment.

As is true of any major industrial facility, drips, leaks and spills occur. In refineries, however, where you have volatile substances and high temperature and rotary equipment operating, extra care is taken to fix drips and leaks very quickly to prevent possible explosions and fires. In addition, where toxic substances are encountered, special care is used to mitigate against any worker accidents. Handling of unrefined and refined product outside of the refinery area in the tank farms and pipings to the tank farms is policed; however, in these areas, there is a higher potential for having significant spillage, even with the monitoring that is occurring at least on a daily and often three times a day basis. At the Powerine Oil Refinery, there have been several leaks from storage tanks as shown on Figure 2.

Other potential sources of ground water polution are buried sumps and underground tanks. In previous geotechnical explorations of the area, Powerine has encountered some buried oil well drilling sumps and some larger sumps which could also be present. Underground tanks are also present on the site and Powerine has registered five of those as shown in Exhibit 2. Several other underground structures exist and all are shown on Figure 2.

SITE HYDROGEOLOGY

General hydrogeologic characteristics of the area is derived from Bulletin No. 104 (State of California Department of Water Resources). The soil and shallow ground water conditions at the site is derived from soil borings made at the site by Fugro, Inc. in July and November 1980, as part of geotechnical investigations for installation of new units. The locations of the borings are shown in Figure 2 and boring logs are presented in Exhibit 3. Information on the wells at the site was obtained from Mr. Dale Epperby, Water Well Supply, who has been involved with water wells at the site and the area of Santa Fe Springs for many years.

The Powerine site is located on the Santa Fe Springs Plain, a low and slightly rolling topographic feature. The site is underlain by the Lakewood Formation, consisting of terrace deposits, Palos Verdes sand, and unnamed upper Pleistocene deposits. In the upper part of the Lakewood Formation, lithologic changes are rapid with discontinuous permeable zones and considerable variation in particle size. These features represent typical stream type alluviation with flood plain fine-grained sediments comprising from 40 to 80 percent of the total deposits. The Lakewood Formation unconformably overlies the lower Pleistocene San Pedro Formation at the site area. The San Pedro Formation includes all strata of lower Pleistocene age. Lithology of the San Pedro Formation is described as gray sand with small gravel interbeds. Fine-grained members in the San Pedro Formation are generally marine type, blue to black clays, sea muds, or quicksands with abundant shells. The total thickness of the Lakewood and San Pedro Formations at the site area is over 1,000 feet.

There are several regional water-bearing units in the Lakewood and the San Pedro Formations. The major water-bearing unit of interest in this study is the Exposition aquifer, the upper water-bearing unit in the Lakewood Formation. The Exposition aquifer is separated from a deeper water-bearing zone by an unnamed aquiclude. The Exposition aquifer consists of interbedded fine materials, as well as permeable zones. The materials in the Exposition aquifer range in size from coarse gravel to clay, with fine deposits separating the lenticular sandy and gravelly beds. The general ground water flow direction in the area is towards southwest, based on the ground water data of all the wells in the area (Annual Survey Report on Ground Water Replenishment, 1985). However, these wells are mostly completed in the deeper aquifers and not necessarily represent the Exposition aquifer.

Stratigraphy

Based on existing soil borings (Exhibit 3), the site is underlain primarily by a sandy-silty clay layer, extending from surface to depths ranging from 6 to 13 feet (Sections A-A' and B-B' in Figures 3 and 4, respectively). Below the clay zone layers of sandy silt to silty sand and sandy-silty clay to clayey silt overlie a thick deposit (on the order of 50 feet) of medium to fine sand. At a depth of about 50 to 60 feet below the ground surface, there appears to be a 4 to 7 feet thick silty clay to clayey silt layer. Below this layer another silty sand to sand layer extends to depths ranging from 90 to 94 feet below the ground surface. Below these depths another silty clay to clayey silt layer is encountered. This layer extends to a depth of 100.5 feet in Boring 19.

Ground Water

Ground water was only encountered during drilling in Boring 19 at a depth of approximately 92 feet. Free ground water flow was not observed in Boring 28 which extends to a depth of 100.9 feet. The available information is not conclusive to determine whether the observed ground water in Boring 19 represents a regional ground water or if it is just an indication of a local perched ground water. No other shallow perched ground water was encountered in the soil borings.

A total of eight water wells were made at the site, however, only wells 6, 7, and 8 (Figure 2) can be presently operated but have not been used since April 1, 1984. The other wells are grouted and abandoned. The wells were being used to provide process water for the refinery. The available information on the wells at the site is presented in Table 1.

As can be noted from Table 1, the wells at the site are deep, extending to deep water-bearing zones, most likely all in the San Pedro Formation. It seems that the shallow water-bearing zone(s) could not provide any or enough water to meet the needs of the refinery operation. In addition, according to Mr. Dale Epperby, the shallow water in the area is salty and cannot be used.

Table 2 summarizes the available water quality of the ground water at Wells 5, 6, 7, and 8, sampled on June 8, 1980. Table 3 presents the water quality data on a sample, collected on March 12, 1931 from No. 1-A sulphur well located 500 feet south of Well 6 at the Norwalk State Hospital ground. Major dissolved chemical constituents in all the wells include calcium, magnesium, sulphate, carbonate/bicarbonate (alkalinity) and chloride. The wells all exceed secondary water standard for hydrogen sulfide concentration. The on site well waters had to be treated for hydrogen sulfide before being used at the refinery. Rather high hydrogen sulfide in the wells could be natural and due to a very reducing condition in the subsurface environment in the San Pedro Formation.

SCOPE OF WORK

The scope of work will include additional literature research, well installation and soil sampling, well sampling and analysis, data analysis, and reporting.

Additional Data

Data has been collected regarding site history and ground water data. Additional data, including historic air photographs, historic topographic maps, additional Powerine drawings and records, additional interviews with current and ex-Powerine employees, and further review of already collected data, will be performed to obtain any other information regarding potential migration of chemicals into the ground water. This additional data review will be performed concurrently with the initial phases of the drilling program and revisions made in the subsequent phase(s) where appropriate.

PHASE 1 - WELL INSTALLATION AND SOIL SAMPLING

Three operating wells exist on the Powerine site. These wells are located as shown in Figure 2. Water quality samples from these wells were taken recently by a consultant working for others. This information, plus additional sampling of these wells should provide information on ground water direction, gradient, and quality in "lower" usable aquifers.

Subsurface information currently available indicates that water may exist at a depth of 92 feet. To obtain additional information regarding the subsurface stratigraphy and to define the site ground water gradient, four wells will be installed in the Phase I program. These wells will be drilled along the perimeter of the property, three downgradient and one upgradient of the refinery area as shown on Figure 2. The wells will be drilled with six-inch I.D. hollow stem augers to about 80 to 90 feet. If ground water is not encountered at this depth, the wells would be continued, using rotary wash drilling equipment or air rotary equipment, if available. These wells would not be drilled below about 150 feet. Between wells, the augers or drill pipe

would be cleaned with a hot water washer or steam cleaner to prevent cross contamination between wells.

Wells would be sampled, using a modified California ring sampler at depth intervals of five feet. The sampler would be cleaned between each sample interval in a TSP solution and then tap water. Drilling would be under the continuous supervision of a field engineer or geologist who would log the hole, assist in obtaining samples, and prepare the appropriate chain of custody and field documentation. All samples recovered from the wells would be sniffed with an organic vapor analyzer to determine if there are any volatile organic pollutants in the soil.

Field programs would be performed under the guidance of IT health and safety personnel and plant rules, whichever are stricter. A field health and safety plan will be prepared and morning tailgate meetings convened to provide appropriate guidance to personnel.

Soil Sample Handling Procedures

Samples recovered in the field would be placed in ice chests and stored at 4°C. Each evening, the samples would be driven to the IT laboratory in Irvine and selected samples would be sent to the IT analytical laboratory for chemical analysis shown on Table 4. These laboratories are in the EPA contract laboratory program and perform analysis according to the appropriate EPA methods. It is anticipated at this time that two to four samples from each boring would be submitted for laboratory analysis. Samples not submitted to IT analytical laboratories, would be stored in the geotechnical laboratory. These samples would be used for preparation of final field logs. Upon completion of the project, the samples would either be returned to Powerine or disposed of at the appropriate disposal site.

Well Installation

Upon completion of the boring, four-inch PVC casing will be installed and a well developed. Typical well installation to be used on this project is shown on Figure 5. Where no water is encountered, the borehole would be cemented up to the top of the lowest clay layer prior to placing the casing. This is to close off a potential pathway for migration to lower soil zones and the aquifer. Well development would consist of surging, bailing, pumping, or vacuuming water from the well until the well was clear and recovered ground-water properties stabilized. Equipment used in well development will be hot water or steam cleaned between each well.

Water levels would be taken after well development and one week later. The well would then be purged of about four well volumes and a sample obtained, using either a teflon bailer or teflon bladder pump. Samples obtained will be

tested for the constitutents as shown in Table 4. Special care will be used in cleaning sample equipment to prevent cross contamination of wells. In general, two sets of equipment will be used, those for wells with free product and those for relatively clean wells with only dissolved product.

Free product will be looked for in the well prior to any sampling. In order to determine if free product is present and what thickness, a clear acrylic bailer will be sent down the well and a sample pulled. In addition to using the acrylic bailer, an ORS type detector may be used to measure the thickness of free product and top of water surface.

PHASE 1 - DATA ASSESSMENT

Upon completion of the Phase 1 program, information obtained from the literature review and well installation program would be assessed and the installation procedures, number, depth, and location of proposed Phase 2 wells revised if appropriate. If revisions are proposed then it will be submitted to the Regional Board for review and comments, prior to implementation.

PHASE 2 - FIELD INVESTIGATION

Phase 2 investigation consists of the drilling and sampling of additional borings and wells. In this phase of the program, we propose to drill and install about six more wells and ten borings at the locations shown on Figure 2.

Well Installation and Soil Sampling

The location of the wells provides for a downgradient perimeter spacing of about 500 feet between wells. This should be adequate to intercept free product plumes migrating off site, if any. During Phase 1, information would be gathered to assist in determining if different well installation methods were needed. Of particular importance to well installation is the depth due to the depth limitations on the preferred drilling method using hollow stem augers. Soil sampling would be done using the procedures described previously; however, sampling intervals may be extended to 10 feet, particularly in some of the wells. Borings would be drilled to the top of the clay layer anticipated at a depth of 50 to 60 feet. Information from the borings would tell us whether product had migrated through the soil and/or if it is parched on top of the upper clay.

Vapor Monitoring Wells

In eight of the shallow borings (Figure 2), two-inch PVC that is slotted below the upper 10 feet will be installed. Wells will be sealed in the upper 10 feet and a small tree installed on top of each well to provide for purging and sampling of hydrocarbons using an OVA meter.

These wells would be sampled by purging the wells of trapped vapor using a high speed vacuum pump, then pulling formation vapors through the OVA meter. Wells would be monitored upon completion of the installation, after the seal has set, and about two weeks later. Depending on the results of additional monitoring, more detailed sample analysis may be needed.

Sample Handling and Well Installation

Sample handling and well installation will be the same as Phase 1.

PHASE 2 - DATA ASSESSMENT

At the completion of Phase 2, a report would be prepared assessing the extent of hydrocarbon migration in the soil and the ground water. If free product is found, the extent and thickness will show on a refinery plan and contours drawn, if sufficient data is available.

In addition, this report would include:

- o Description of field exploration program.
- o Boring and well logs providing:
 - Soil description/classification;
 - Samples sent for analysis;
 - Well installation data, such as screen interval, gravel pack, type and length, seal location, etc.;
 - Water levels.
- o Vapor monitoring data.
- o Description of analytical program, including:
 - Tabular summary of all analytical data:
 - Laboratory reports.
- o History of site development as it effects potential for ground water contamination.
- o Plan showing location of all suspected and confirmed areas where leaks occurred of hydrocarbons.
- o Plan showing extent of vapor plumes, if any.
- o A plan for additional field exploration and sample analysis to better define free, dissolved, and vapor phase plumes, if necessary.

SCHEDULE

The anticipated schedule for the work is shown in Figure 6. This schedule can be compressed by initiating Phase 2 about one week after sampling (determining gradient) of wells in Phase 1.

CONCLUSION

The proposed phased workplan provides a logical method to assess the potential for ground water degradation at the Powerine Oil Company Refinery due to post hydrocarbon drips, leaks and spills. Modifications in the program may be required as the data is obtained and the phased program allows a convenient step in time at which to accomplish those modifications.

If you have any questions regarding this program, please do not hesitate to contact Mssrs. Sirota or Mehran of IT Corporation.

Respectfully submitted,

IT Corporation

Edward Sirota

Director of Technical Services

and Site Remediation

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TABLE 1

AVAILABLE DATA ON THE WELLS AT THE POWERINE SITE

WELL NO.	DEPTH (ft)	DEPTH TO STATIC WATER LEVEL (ft)	PERFORATED INTERVAL (ft)	LOCATION
1	NA	NA.	NA	NA
2	275	NA	NA	Figure 2
3	266	NA	NA	NA
4	60 9	NA	580-600	NA.
5	780	NA	NA	Figure 2
6	840	109 (Date ?)	NA.	Figure 2
7	690	. NA	450-530 600-690	Figure 2
8	994	75 (Jan 1984)	NA	Figure 2

NA = Data not available.

TABLE 2
WATER ANALYSIS REPORT
ON WATER SAMPLES FROM THE
ON SITE WELLS*

DETERMINATION	NO. 5 WELL	NO. 6 WELL	NO. 7 WELL	NO. 8 WELL
pН	8.1	8.2	8.5	8.3
Specific Conductance, micromnos, 25°C	1,242	870	1,067	1,188
Phenolphthalein Alkalinity as CaCO)3, ppm	0	0	10	0
Methyl Orange Alkalinity as CaCO ₃ , ppm	258	314	352	237
Sulfate and Sulfite as	207	00	200	20.2
SO ₄ , ppm Chloride as Cl, ppm	397 109	90 89	200 98	293 102
	109		90	102
Total Hardness as CaCO ₃ , ppm	357	141	232	368
Calcium as CaCO3, ppm	211	86	129	224
Magnesium as CaCO ₃ , ppm	145	55	103	144
Silica as SiO ₂ , ppm	28.0	25.3	29.4	28.8
Total Phosphate as PO ₄ , ppm	<0.4	<0.4	<0.4	<0.4
Total Inorganic Phosphate				
as PO ₄ , ppm	<0.2	<0.2	<0.2	<0.2
Ortho Phosphate as PO4, ppm	<0.2	<0.2	<0.2	<0.2
Chromate as CrO ₄ , ppm	0	0	0	0
Chromium as Cr, ppm	0	0	0	0
Total Copper as Cu, ppm	<0.05	<0.05	<0.05	<0.05
Total Iron as Fe, ppm	0.12	0.12	0.12	0.33
Soluble Zinc as Zn, ppm	0.10	<0.1	<0.1	0.1
Sulfides as H ₂ S, ppm	1	18	28	1

^{*}Water Quality Analysis Report, Betz, Trevose, Pennsylvania June 8, 1980.

TABLE 3

RESULTS OF WATER ANALYSIS REPORT* ON WELL NO. 1-A SULPHUR AT THE NORWALK STATE HOSPITAL GROUND

NO. 1-A SULPHUR WELL

		PARTS PER MILLION	GRAINS PER U.S. GALLON
MINERAL SUBSTANCES:			
Silica Iron and Aluminum Oxides Calcium Magnesium Sodium Bicarbonates Carbonates Chlorides Sulphates	SiO ₂ R ₂ O ₃ Ca++ Mg++ Na+ HCO ₃ CO ₃ CO ₃ CO ₃	12.8 0.6 31.3 10.8 153.4 192.9 54.0 80.4 90.6	0.75 0.03 1.82 0.63 8.94 11.25 3.15 4.69 5.28
Nitrates Total Solids MINERAL SALTS: (Hypothetic	NO ₃₋ -	- 559 . 1	32.60
Iron Bicarbonate Calcium Bicarbonate Magnesium Bicarbonate Sodium Bicarbonate Calcium Sulphate Magnesium Sulphate Sodium Sulphate	Fe(HCO ₃)2 Ca(HCO ₃)2 Mg(HCO ₃)2 NaHCO ₃ CaSO ₄ MgSO ₄ Na ₂ SO ₄	125.3 63.5 63.0 1.5 1.0	- 7.31 3.70 3.67 0.09 0.06 7.64
Calcium Chloride Magnesium Chloride Sodium Chloride Sodium Carbonate Iron Oxide Aluminum Oxide Uncombined + Insol	CaĈ1 ₂ MgC1 ₂ • NaC1 Na ₂ CO ₃ Fe ₂ O ₃ Al ₂ O ₃ SiO ₂	none none 132.6 95.4 trace 0.6 12.8	- 7.73 5.56 - 0.03 0.75

TABLE 3 (Continued)

		PARTS PER MILLION	GRAINS PER U.S. GALLON
HARDNESS: (In terms of Calciu	ım Carbonate,	CaCO ₃)	
Due to Lime Salts Due to Magnesia Salts Due to Iron Salts		78.4 44.2	4.57 2.58
Total Hardness Temporary Hardness Permanent Hardness		122.6 120.7 1.9	7.15 7.04 0.11
TREATMENT, per 1,000 gallons t	to result in a	softened wate	r:
Hydrated Lime Soda Ash	Ca(OH) ₂ Na ₂ CO ₃		0.75 pounds none
Hydrogen Sulphide, Parts free and combined	s per million H ₂ S	2.42	•

^{*}Sample was submitted by State Department of Public Works to Los Angeles Testing Laboratory, on March 12, 1931.

TABLE 4

CONTAMINANT SURVEY PARAMETERS

		METHO	METHOD				
PARAMETER	SOIL	LIQUID HC	GROUND WATER				
Total Organic Carbon	, *	* .	*				
Oil and Grease (If TOC cannot be done)	+	+ ,	· *				
Chlorides	-	~	*				
Sulfates	-	-	*				
Phenols	* .	*	*				
Volatile Organics	*	*	*				
Total Organic Halogens	*	*	*				
Metals	•		•				
Arsenic	*	. *	*				
Cadmium	*	*	*				
Chromium	*	*	*				
Cobalt	*	*	*				
Cyanide	*	*	*				
Lead	*	*	*				
Mercury	*	*	*				
Molybdenum	*	*	*				
Nickel	*	*	*				
Selenium	*	*	*				
Vanadium	*	*	*				
Zinc	*	*	*				
pH	~	-	*				
Specific Conductance	~	-	*				
Total Hydrocarbon (in vapor)	x		~				

Note: All the samples would be submitted to IT Analytical Laboratories for chemical analysis. These laboratories are in the EPA Contract Program and perform analysis according to the appropriate EPA Methods.

- * According to appropriate EPA Methods
- + According to appropriate Standard Method
- x Portable analyzer (GC/FID, if needed)
- No analysis

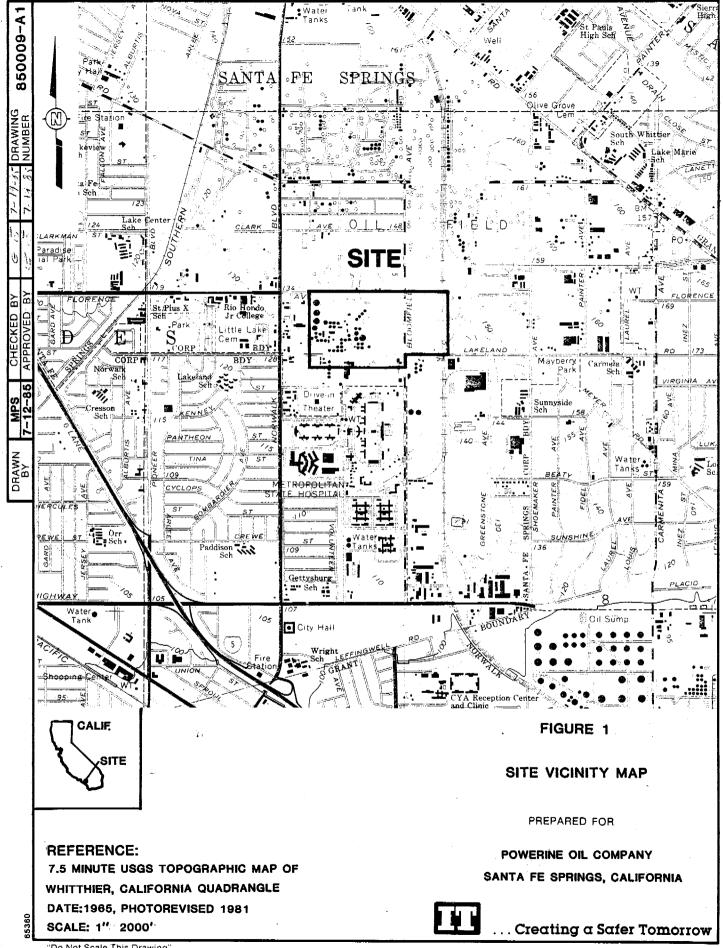


FIGURE 2

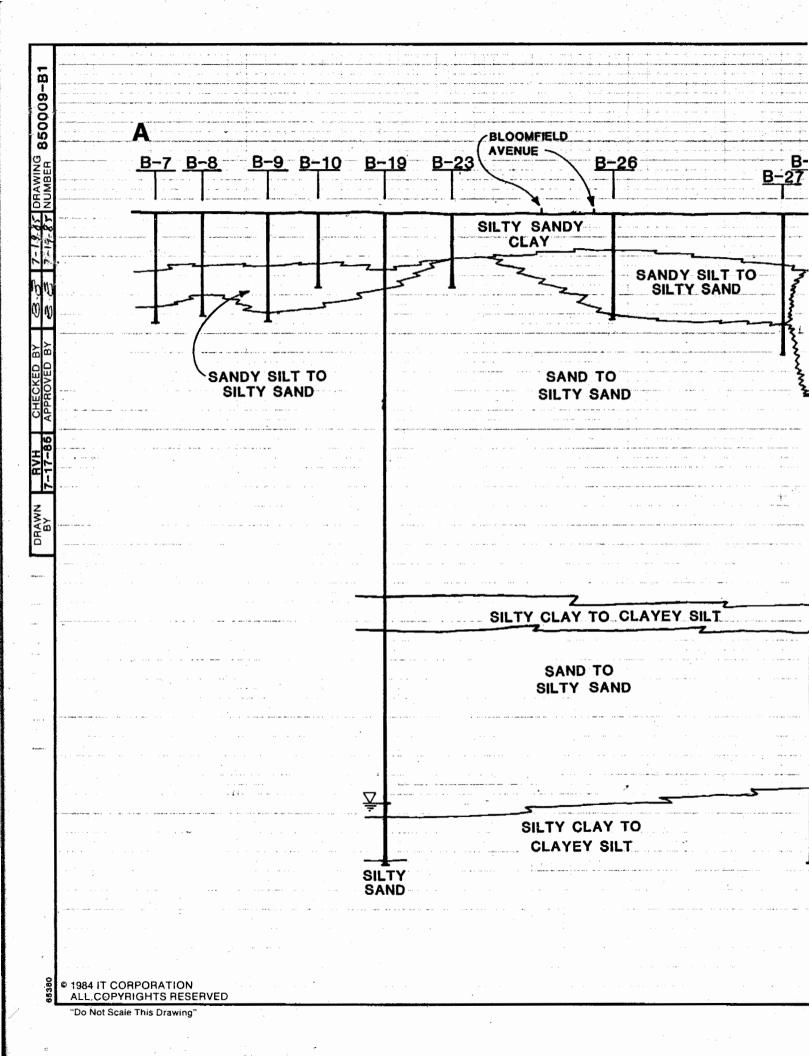
SITE PLAN

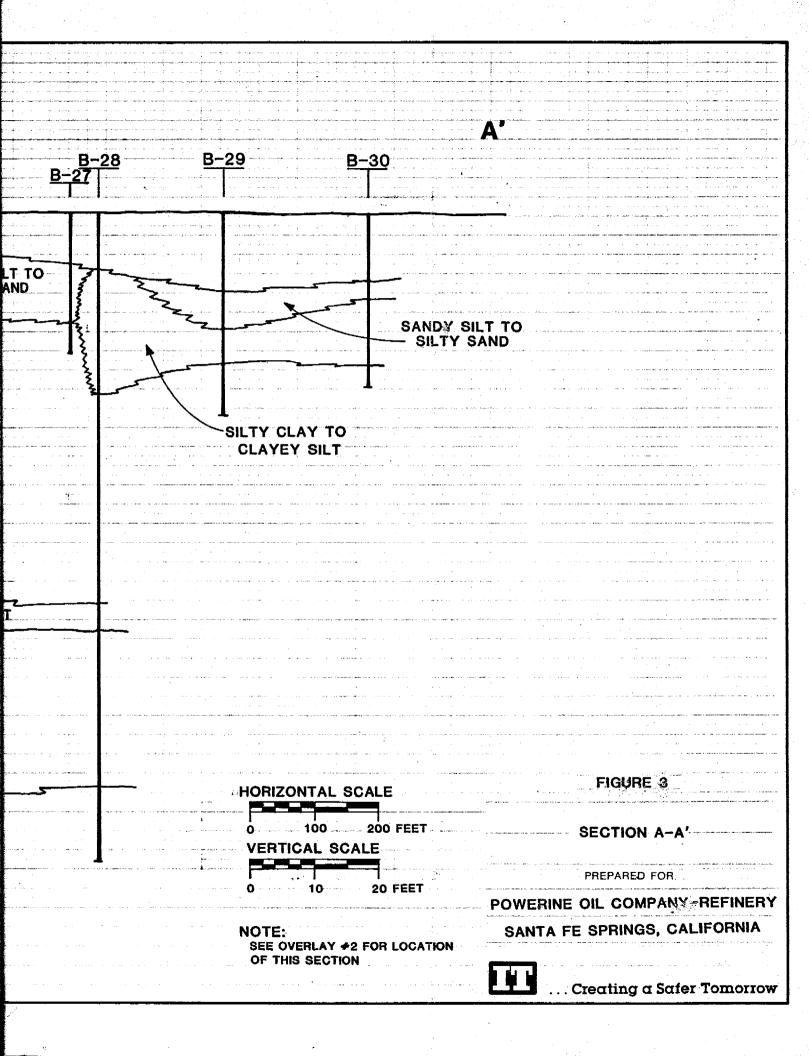
PREPARED FOR

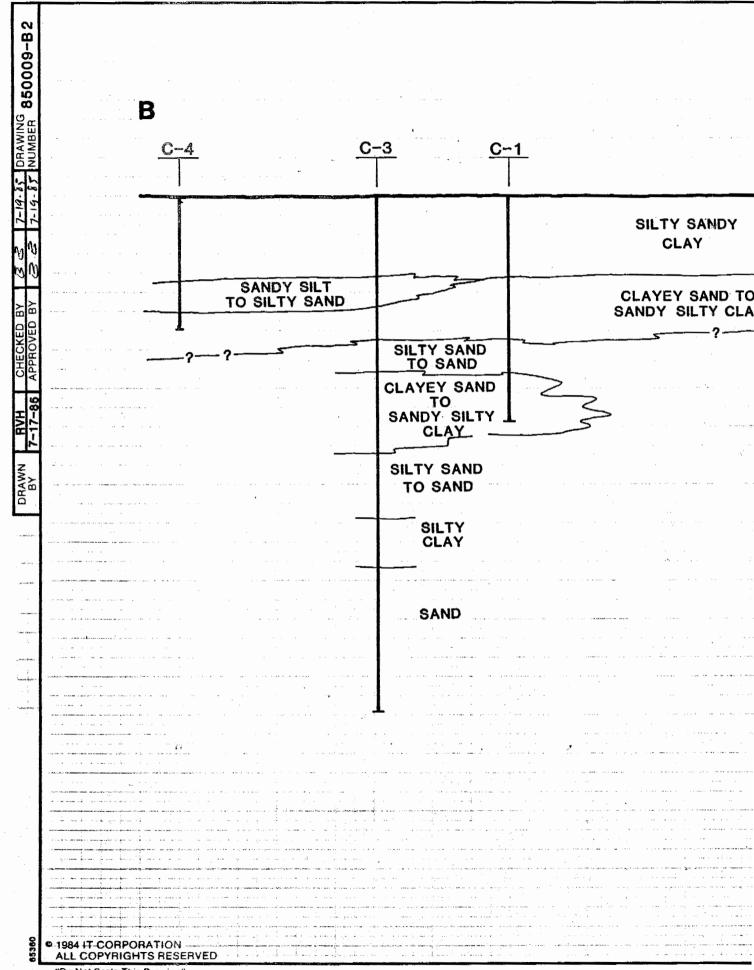
POWERINE OIL COMPANY-REFINERY SANTA FE SPRINGS, CALIFORNIA

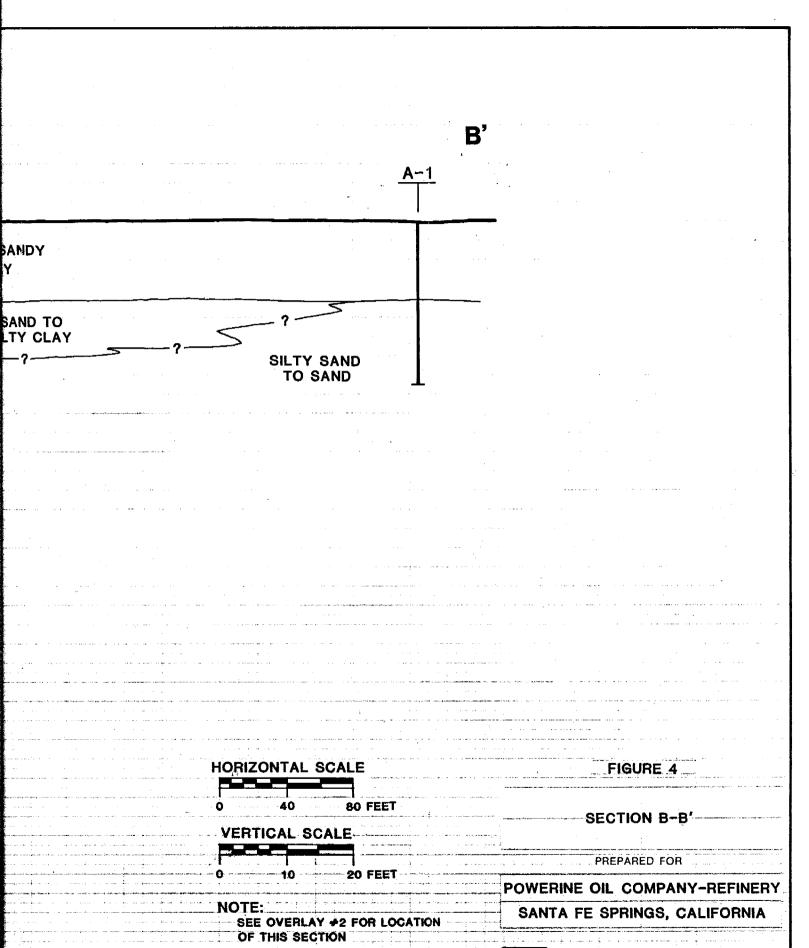


...Creating a Safer Tomorrow









... Creating a Safer Tomorrow

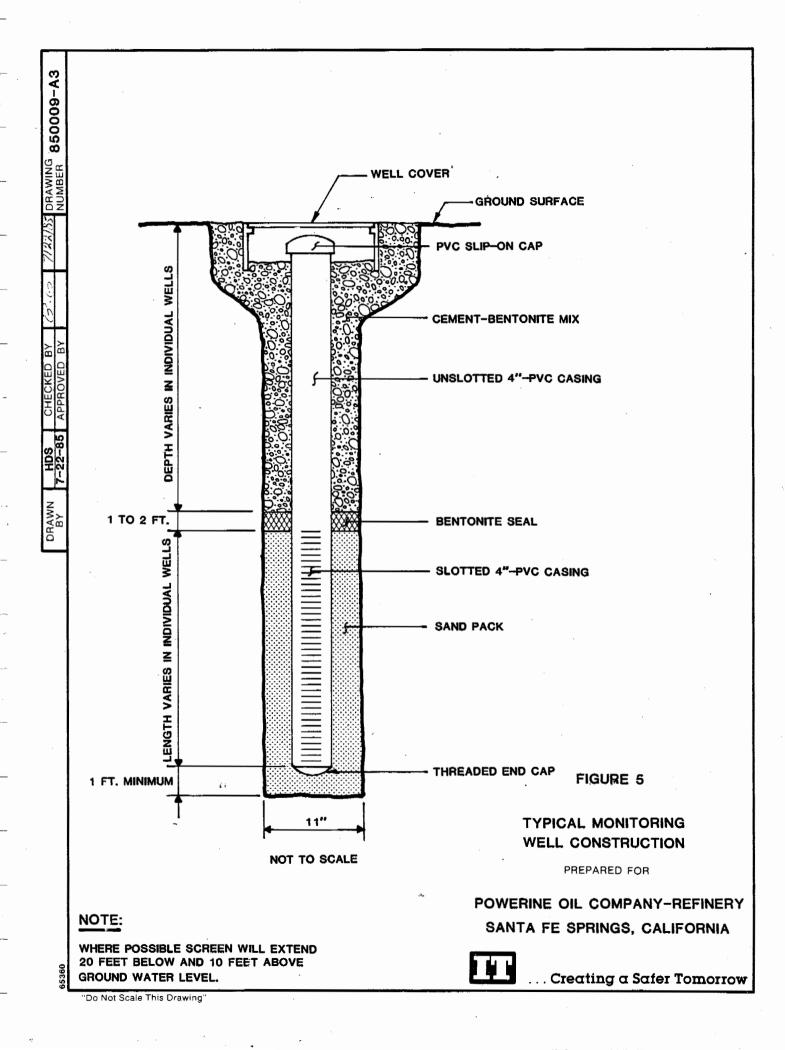
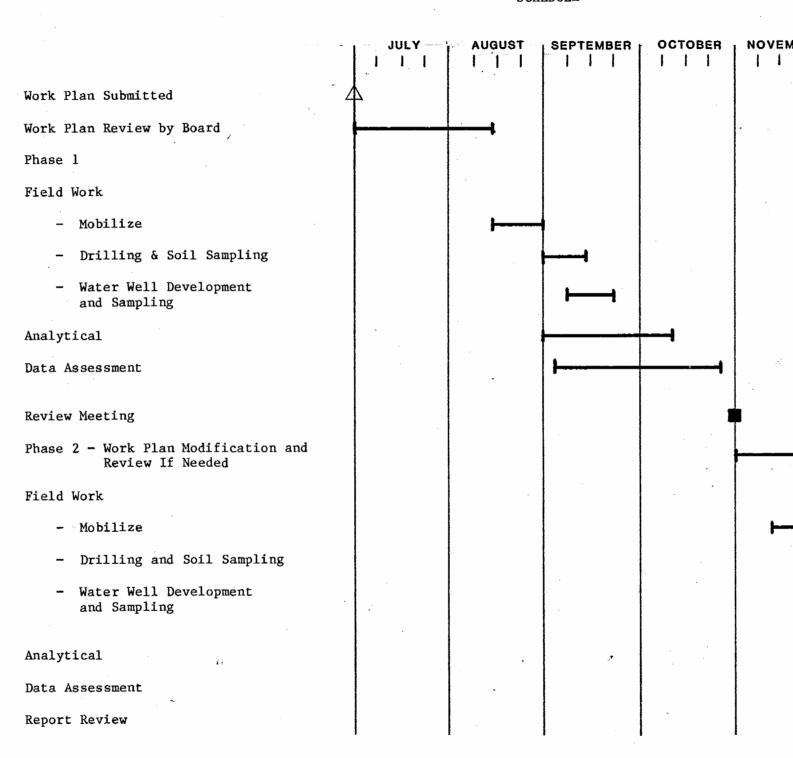


FIGURE 6
SCHEDULE



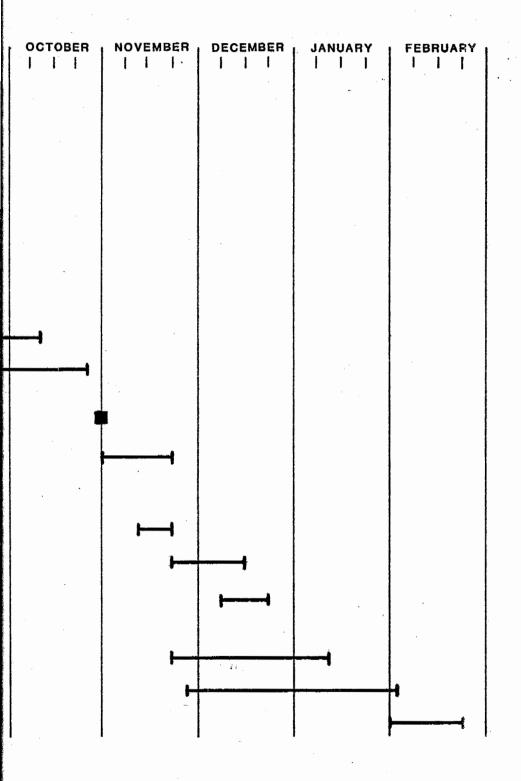


EXHIBIT 1

EXHIBIT 1

HISTORY

Powerine Oil Company had its beginning in the late 1930's when Harry S. Rothschild, Sr., took over a small foundering refinery in a corner of a pasture in Santa Fe Springs. Through foresight and innovative leadership, this family owned company grew to one of the west's largest independent oil companies operating in all phases of the industry; drilling, production, refining, service stations, trucking, pipelines and terminals.

Powerine has a record of continuously expanding resources, backing up the ability to produce and deliver - on time, at low prices, with consistent high quality.

- 1941 Purchase of first new truck unit for product delivery.
- 1946 Brought into production first oil well.
- 1950 Opened its original self-serve station; one of the first of its kind selling over 500,000 gallons in the first month's operation.
- 1954 Added platinum process to the refinery. First of its kind on the west coast and second in the United States; first 95 octane gasoline introduced on the west coast.
- 1961 Completion of the Lomax Refining Unit The first commercial hydrogen cracking process in the world; first 100 octane gasoline on the west coast.
- 1964 Terminal and Pipeline Expansion Long Beach Marine Terminal; No. 1 pipeline from Long Beach to Santa Fe Springs; San Diego Terminal; Phoenix Terminal.
- 1966 Completed construction of Oakland Terminal.
- 1967 Added FCC Complex (fluidized catalytic cracker) to refinery; increased gasoline producing capability.

- 1968 Introduced the coin-operated, change making dispenser to self-service gasoline stations.
- 1970 Added terminal in Tacoma, Washington.
- 1971 Added No. 4 pipeline from the Los Angeles harbor area to Santa Fe Springs.
- 1972 Contract with City of Long Beach for production of Parcel "A" in the Wilmington Field.
- 1974 Added new crude unit to refiner almost doubling capacity.
- 1976 Added Barbers Point Terminal State of Hawaii.
- 1980 Started heavy oil upgrading project.
- 1982 Completed heavy oil upgrading project.
- 1984 Filed for Chapter 11 bankruptcy.

POWERINE Oil Company

12354 Lakeland Road, P. O. Box 2108 Sente Fe Springs, Calif. 90670-9883

(213) 944-9861 (213) 944-6 [1]



The West's Largest Independent Refinery And Marketing Chain

December 20, 1984

Hazardous Substance Storage Statement State Water Resources Control Board P. O. Box 100 Sacramento, California 95801-0100

Dear Sir:

Forwarded are five Hazardous Substance Storage Statements and a \$50.00 check for registration fees on the following items:

East Alky Neutralization Pit West Alky Neutralization Pit Premium Gasoline Tank - 868253 Unleaded Gasoline Tank - 868254 Regular Gasoline Tank - 868257

Please call if you have any questions.

Very truly yours,

Liemba

Coordinator of Environmental

Affairs

WJZ:jp

Encl.

cc: Henry Del Castillo Jim L. Farragh

Official Registration Form

California Water Resources Control Board Hazardous Substance Storage Statement



ZtP

Who Must File: Each person storing hazardous substances in any underground container must file this form no later than July 1. 1984 (After October 1. 1984 and no later than January 1. 1985 for tanks used on farms).

Definition of Underground Containers: The law applies to "concrete sumps increalled buried tanks or other underground containers" (Water Code section 13173) All containers including earner walled pits, points lagoons and sumps that are below the normal ground surface level must register. A tank sitting on the ground is not included. Containers partially beneath the surface are included under or unlined pits, points and agoons are covered if earn har been removed from the storage area to construct the tackity. Normal grading is not considered construction below ground leve.

Definition of Hazardous Substance: Any substance listed in Section 6382 of the Lador Code or in Section 25316 of the Health and Safety Code This includes gasoline dieset fuel all industrial solvents pesticides herbirdoes and lumigants. If the material must be carried by a registered hauler disposed of at a hazardous waste site, is explosive, generates pressure due to hear or decomposition or would harm humans or wildlife you must register

I Owner

Name (Corporation, Individual or Public Agency)

POWERINE OIL COMPANY

the tank. Wastes are included

feet: For each tank registered a \$10 fee must be paid except that retail gasoline stations pay \$5 per tank

Penalties: For failure to file, the penalty is \$500-\$5,000 per day, If you fails if information, you can be lined up to \$20,000 for each pay the information is incorrect and has not been corrected.

incorrect and has not been corrected.

Contidentiality: If you have information protected by trade secret laws please attach a list of the information on this form that is confidential and the justification for confidentiality including specific citations of relevant statutory and case law.

fully and case law Multiple Containers: fill I and II on one form and leave it blank on all the remaining forms. Atlach all forms together securely 1' you own more than 50 tanks you can file information on computer labor. Call 916–324-1262 for information.

This is not a Permit Application. All Underground Tanks will be subject to local regulation. Some publications have already begun programs. Check with your local county government for further information.

NOTE: ALL UNDERGROUND CONTAINERS MUST REGISTER EVEN IF STATE AND/OR LOCAL PERMITS ARE IN FORCE.

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FOR STATE USE ONLY

Date Received

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Official Registration Form

California Water Resources Control Board Hazardous Substance Storage Statement



Who Must File: Each person storing hazardous substances in any under-ground container must hie this form no later than July 1, 1984 (After October 1, 1984 and no later than January 1, 1985 for tanks used on farms)

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Definition of Underground Containers: The law applies to concrete sumps nonvaulted buried tanks or other underground containers. (Water Code Section 13173) All containers including earlier walled pits, ponds agroins and sumps, that are below the normal ground surface level must register. A tank shing on the ground is not included. Containers partially beneath the surface are included. Lined or unlined pits ponds and lagoons are covered it earth has been removed from the storage area to construct the 'actility. Normal grading is not considered construction below ground level.

Definition of Hazardous Substance: Any substance listed in Section 6382 in the Labor Code or in Section 25216 of the Health and Safety Code This includes gasoline, dieself fuel all industrial solvents, pesticides herbicides and lumigants if the material must be carried by a registered hauleff disposed of at a hazardous waste site is explosive generates prossure due to heat or decomposition or would harm humans or wildule you must register

I Owner

the tank Wastes are included

Fee: For each tank registered a \$10 fee must be paid except that retail gasoline stations pay \$5 per tank

gasoning stations pay as per valid.

Penalties: For failure to file the penalt, is \$500-\$5,000 per day if you talsify information you can be lined up to \$20,000 for each day the information is incorrect and has not been corrected.

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NOTE: ALL UNDERGROUND CONTAINERS MUST REGISTER EVEN IF STATE AND/OR LOCAL PERMITS ARE IN FORCE.

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6 Underground Piping:	□ o Gravity □ ω Pre	ssure 🗆 a Suction	2 Unknown	
C Piping Repairs:	□ o₁ None □ · ∪nkn	own 🗆 🗅 Yes Year	of most recent repair	
VII Leak Detection				
□: Visual □= Sto	ock Inventory 🗆 🕾 Tile Dr	rain 🔲 🕾 Vapor Snift	Wells 🛛 - Sensor Ins	rument
☐ → Ground Water Mo	nitoring Wells Pressu	ire Test - 🗆 - Internal	Inspection P. None	
G - Other				
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	d instructions before signing	ve officer at the level of vic	Propertient of the an authoriza	ed representative. The representative
ranking elected official or aut	verall operation of the facility whi thorized representative of a public ed under the penalty of perjury a	ere the tank(s) are located ic agency	2) a general partner propriet	or or 3) a principal executive officer
Signature			reage, is not and contect.	Date
Printed Name	DEL CASTILLO	tue Ine		DEC. 20, 1984 Prove n see code (213) 904-6111
IVELRY	DEL CASTILLO		F. GEN. MGC.	(213) 904-6111
lend check to: Hazardous S	Substance Storage Statement. Si	tate Water Resources Cont	rol Board, P.O. Box 100, Sac	ramento, CA 95801-0100
Person Fang Statement		· · · · · · · · · · · · · · · · · · ·	Phone w area code	
<u> ω.J. 2</u>	IEMBA	•	(213) 944-	-611
For additional terms or n	nore information call 916/3:	24-1262		
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FOR STATE USE ONL	.Y			

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Official Registration Form

California Water Resources Control Board Hazardous Substance Storage Statement



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NOTE: ALL UNDERGROUND CONTAINERS MUST REGISTER EVEN IF STATE AND/OR LOCAL PERMITS ARE IN FORCE.

I Owner								
Name (Corporation Individual or Pul	ouc Agency)							
Street Address			•		City		State	Z1P
II Facility								
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VII Leak D	etection							
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Signature: The must be respon ranking elected This form has to squature Signature S	Hazardous Si	, Le Vec	orage Si	latement, :		RESources Contro	ol Board, P.O. Box 100, Sac	DEC. 20, 1984 Propre w area code (2/3) 944-6/1/ cramenio CA 95801-0100
must be respon ranking elected This form has b Signature Printed Name Send check to: Person Fong Statema	Hazardous Si	USC USTANCE SI	orage Si	latement.	State Wa	Resources Control	ol Board, PO Box 100, Sac	DEC. 20, 1984 Propre w area code (2/3) 944-6/1/ cramenio CA 95801-0100
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Official Registration Form

California Water Resources Control Board Hazardous Substance Storage Statement



Who Must File: Each person storing hazardous substances in any underground container must life this form no later than July 1, 1984 (After October 1, 1984 and no later than January 1, 1985 for tanks used on farms).

Definition of Underground Containers: The law applies to concrete sumos nonvaulted oursed lanks or other underground containers. (Water Code section 13173) All containers including earthen waited pits bonds lagoons and sumps, that are below line normal ground surface level must register. A tank sitting on the ground is not included. Containers partially beneath the surface are included Lined or unlined pits ponds and lagoons are covered it earth has been removed from the storage area to construct the facility. Normal grading is not considered construction, being grading is not considered construction. Section 6:382.

Definition of Hazardous Substance: Any substance listed in Section 6.382 of the Labor Code or in Section 2.5316 of the Heath and Safety Code. This includes gasoline dieset fuel all industrial solvents pesticioes herbicioes and furnigants. If the material must be carried by a registered hauler disposed of at a hazardous waste site is explosive generates pressure due to heat or decomposition or would harm humans or wildlife you must register.

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Multiple Containers: Fill I and II on one form and leave it blank on all the remaining forms. Attach all forms together securely. If you own these than 50 tanks you can file information on computer tape. Call 915, 324, 1262 for information.

This is not a Permit Application. All Underground Tanks will be subject to local regulation. Some sursolctions have already begun programs. Check with your local county government for further information.

NOTE: ALL UNDERGROUND CONTAINERS MUST REGISTER EVEN IF STATE AND/OR LOCAL PERMITS ARE IN FORCE.

I Owner									
Name (Corporation Individual or Pu	axc Agency)								
Sireel Address			•		City			State	ZIP
II Facility								' 	
Faculy Name					Dealer Foren	Nan - Supervisor			<u> </u>
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Number of Tarks at this Facility	Rural Areas Only:	Township	1	Range			Secr	on	
III 24 Hour Emerge	ency Contact	Person					4		
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IV Description						- la		<u>.</u>	
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B. Manufacturer (if app	ropriate):	UK Ye	ar of Mfg: <u>VA</u>	<u>~~. </u>	c	Year installe	ed:	976	☐ Unknown
D. Container Capacity.									· · · · · · · · · · · · · · · · · · ·
F. Is Container currentl	y used? 🕬 ं	Yes □ ∞ No ii	No, year of last	use:					🗀 o3 Unknown
G. Does the Container	Store (Check C	Dne): □ o Wast	e ID∞ Product						
H. Does the Container	Store Motor Ve	hicle Fuel or Wa	ste Qil? 🗆 o: Ye	es 🗆 o	No 1	f Yes. Check	approp	nate box(es):
Ø Unleaded □ ∞	Regular 🗆 🛭 🗷	Premium 🗀 😘	Diesel ⊡os Was	ste Oil	□ as Othe	er (List):			
V Container Constr		· · · · · · · · · · · · · · · · · · ·		-					-
A Thickness of Primar	y Containment:		Gauge 🗆 Inches	s 🗆 cı	n Birdin	known		<u>,</u>	
8. 🗆 o Vaulted (Locate	d in an undergr	ound Vault.)	□ ∞ Non-vaulted	ı e	as Unknov	wn			
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D. 🗆 n Carbon Steel	🗆 oz Stainless	Steel 🗅 🗅 s	iberglass 🗆 o	4 Polyvi	nyi Chlari	de 🗆 os (Concrete	- 0%	Aluminum
□ or Steel Clad □	o Bronze	□ ∞ Composite	□ 10 Non-met	allic	O E	arthen Walls			
□ Unknown □	13 Other:								
E. Do Rubber Lined	□ o₂ Alkyd Lir	ning 🗆 cs Epo	xy Lining 🗀 o	⊭ Pheno	olic Lining	□ os Gia	iss Linin	ıg 🗆 🗷	Clay Lining
□ or Unlined 🛂 🕏 6	Unknown [□ ∞ Other							
F □ ∞ Polyethlene Wra	p □ o₂ Vinyt	Wrapping C	los Cathodic Prot	ection	ن يس	nknown	□ as Nor	ne 🗅 :	o Other

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C. Piping f	Repairs		ت 🗆	ı No	ne	C		Un	kno	Λ'n		to Yes. Year of most recent repair	
VII Lesi	k Detect	ion											
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□ · Gr	 ound Wat	er Monit	oring	Well	s		lur f	2:5	Su	e T	est	□: • Internal Inspection	÷
□ re Ott	ner												
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M.	ELRY	_v€	7	C	15	7,	~	ه2				REF. GEN. MGR.	(213) 944-6111
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	L	u . J		11	5	M	B	Ð				(213) 900	-6111

FOR STATE USE ONLY

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I Owner							
Name (Corporation (Individual or Pu	OLC Agency1		,				
Şireer Address				City	· · · · · · · · · · · · · · · · · · ·	Siale	ZIP
II Facility				· · · · · · · · · · · · · · · · · · ·	_		
Facety Name				Dealer Fore	man Supervisor		
Sireer Address						Nearesi Cross Stree	,
Cay					County	•	ZIÀ
Maining Acidness				City		State	ZIP
Prione w area code			Type or Business On Motor Vehic	cle Fuel Station	□ ∞ Other:		
humber or Tarks as this Facale	Rural Areas Only:	Township		Range		Section	
III 24 Hour Emerge	ncy Contact	Person	-	-			
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IV Description							
A. O Tank □ ∞ Sun	np 🗆 🛭 s Lagoo	n, Pit or Pond (of Other.		Com-	6825	is no number assion on .
B. Manufacturer (if app	ropriate): L	▶ 火 Ye	ar ol Mig	UK			
D. Container Capacity.	9112-gallor	ns 🗆 Unknown	E. Container R	epairs: 🗆 💀 Nor	ne 🕿 🛣 Unknow	n □o₃Yes	Year
F. Is Container current	y used? 🖭	Yes □ ∞ No ‼	No. year of last	use:			🗆 🛭 🛭 Unknown
G. Does the Container	Store (Check C	One): □□ Wast	e Product				
H Does the Container	Store Mator Ve	hicle Fuel or Wa	iste Oil? 🔘 oi Ye	s □ cz No	If Yes. Check ap	propriate box	(es)
🗆 on Unleaded 🖼	Regular 🗆 🕫	Premium □ ω	Diesel 🗆 os Was	ite Oil □ ⇔ O1f	ier (List):	····	
V Container Constr	uction						
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B. □ ∞ Vaulted (Locate	d in an undergr	round Vault.)	□ ∞ Non-vautted	Unkno	wn		
C □ o Double Walled	□ ∞ Single	Walled □ ໝ ໂ	_ined □ o Wr	apped D	Jnknown □ α	None	
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🗆 or Steel Clad 🗆	oa Bronze	□ ∞ Composite	□ io Non-mei	rallic 🗆 🖽	arthen Walls		
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F 🗆 c Polyethlene Wra	p □s; Vinyl	Wrapping [as Cathodic Prot	ection 194	Jnknown □ a:	None 🗆	- Other

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C. Piping Rep	airs:		_ □ 01 N	lone	G	Ú	nkno	wn		دن Yes.	Year o	of most rec	ent repair:		
VII Leek C	etection														
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🗖 🕫 Groun	d Water M	onitor	ıng W	ells	= :	. Pre	essur	e T	est	□ e In	ternal	Inspection	None	:	
□ - Other															
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Send check to	Hazardous	Subs	iance	Storag	e Stat	eme	nt Sta	ate ,	Wat	er Resource	s Cont	rot Board. P	O Box 100 Sa	cramento, CA 9580	1-0100
Person Fling Statem	" W .	J	2 /	En	18	Д						17 13	3 994	-6111	
For additions	i forme or	mer.	inte	email.	20.00		6/20	· · ·	20.	,					. "
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	USE ON														

EXHIBIT 3

LOGS OF BORINGS

PREPARED BY

FUGRO, INC., CONSULTING ENGINEERS AND GEOLOGISTS, 1980, FOR GEOTECHNICAL INVESTIGATION OF THE POWERINE REFINERY SITE FOR INSTALLATION OF NEW UNITS

DEPTH	SAMPLE TY	PE					•	1	0		20		30	1	4	0	_
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10-80

FIGURE A-1

T THIN WALL TUBE SAMPLE (ASTM 01587)

40 30 10 20 SAMPLE TYPE DEPTH DENSITY/ PENETRATION RESISTANCE 90 100 110 120 FEET SOIL TYPE MOISTURE CONSISTENCY COLOR ٥ SANDY CLAY (CL), oily, possible fill Black Moist Firm to stiff ٥ SANDY CLAY-CLAYEY SAND (CL-SC), oily, possible fill, with wood shreds 8 SILTY SAND-SANDY SILT (SM-ML), non-Light Very stiff brown gray plastic 10 s 32 Gray (SAND (SP), fine Dry Medium dense ٥ 23 SILTY SAND-CLAYEY SAND (SM-SC), fine Dark sand, low plasticity brown 20 s 28 BORING TERMINATED AT 20.5" 25 -30 35 40 PROJECT NO .: 80-241 DATE DRILLED: 9-3-80 fuceo EQUIPMENT USED: 8" HOLLOW STEM AUGER WATER LEVEL: NOT ENCOUNTERED POWERINE REFINERY S STANDARD SPLIT SPOON SAMPLE A DRY DENSITY (LB/CU FT) FIELD MOISTURE (% DRY WT) D FUGRO 2 1/2" DRIVE SAMPLE (ASTM 02216) LOG OF BORING NO. A-2 B BULK SAMPLE

NR NO RECOVERY

10-80

FIGURE A-2

T THIN WALL TUBE SAMPLE (ASTM 01587)

EPTH	SAMPLE TY	PE					•	10	כ		20		30)	40	,
FEET	PENETRATION RESISTANCE	MOISTURE	DENSITY/ CONSISTENCY	COLOR		SOIL TYPE	A	9	0		100		11	0	12	0
0 —	1	Moist	Stiff	Dark	4" gravel at surfa	ce					П				-	
+		MOSC	34	Jan	SILTY CLAY (C	L), medium plasticity						П				
+											П	\prod				1
4	\$ 26											П			-	11
+	D 36										П				A	
5	_					•					П	П	T	Ī	İ	-
-											П	1				
-				Links	SANDY CLAY /	CL), medium plasticity					П				-	
+			Hard	Light brown	SANDY CLAY	CLI, mediam plasticity					П	П		П		
┪	S 56/6'									П				11.	-	
10 —	36/8										П	П	П	II	П	
-												П		T		
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-				†			H^{\dagger}				\forall					t
20 —	S 57		Very dense	ľ			H			-	Н		+	1		+
-		<u> </u>					$H \dagger$		Н		Н	Н	\forall	Ħ	1	t
-							H +		\vdash		H	H		$^{+}$	+	+
-				Gray	SAND (SW) fine	to coarse, traces of gravel to	H	Н	+	+	H			H		+
-				3.27	%" recovered	, 10 com 12, 11 acc 01 graver 10	H +				H			\dagger	il	+
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-	S 80						H +		H	H	Н	Ш	╫	+	\exists	t
-					BORING TERM	INATED AT 26.5'	₩	H	\vdash	H		H	Н	+	\forall	+
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-							H			-			+	+		-
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ELEVA EQUIPI	TION: MENT USED: 1	B" HOLLOV		ILLED: 8.2 ER	9-80	TUGRO PROJECT	NO								٥	٠.
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	NDARD SPLIT SE			DRY DENS	SITY (LB/CU FT)		-0	4 4 E	. 11	IIV.	ا ب -	16	r 11	N E I	1 1	
	RO 2 1/2" DRIVE S			FIELD MOI	STURE (% DRY WT)											
=			•	(ASTM D2		LOG OF BO	RIN	G	Ν	0	Δ	\-3				
	K SAMPLE		N	R NO RECOV	/ERY			_	•							
THI	N WALL TUBE SAM	API F														

FIGURE A-3

THIN WALL TUBE SAMPLE

30 40 SAMPLE TYPE 10 20 DEPTH IN PENETRATION RESISTANCE DENSITY/ 90 100 110 120 FEET SOIL TYPE COLOR ο. 3" gravel at surface Dark Moist Hard brown SILTY CLAY (CL), medium plasticity 47 D S 42 Very stiff SANDY CLAY (CL), medium plasticity D 25 10 Dry Medium Light SAND (SP-SM), fine, angular densa 21 15 SAND (SP), fine to medium Very Gray dense 56 \$ 20 -BORING TERMINATED AT 20.3' 25 30 35 40 80-241 DATE DRILLED: 8-29-80 PROJECT NO .: EQUIPMENT USED: 8' HOLLOW STEM AUGER WATER LEVEL: NOT ENCOUNTERED POWERINE REFINERY S STANDARD SPLIT SPOON SAMPLE (ASTM D1586) A DRY CENSITY (LB/CU FT) D FUGRO 2 1/2" DRIVE SAMPLE FIELD MOISTURE (% DRY WT) LOG OF BORING NO. A-4 (ASTM D2216) B BULK SAMPLE

NR NO RECOVERY

10-80

THIN WALL TUBE SAMPLE (ASTM 01587)

FIGURE A-4

B BULK SAMPLE

THIN WALL TUBE SAMPLE (ASTM D1587)

NA NO RECOVERY

(ASTM D2216)

LOG OF BORING NO. A-5

10-80

FIGURE A-5

30 40 10 20 - SAMPLE TYPE DEPTH DENSITY/ PENETRATION RESISTANCE 120 90 100 110 FEET SOIL TYPE COLOR SILTY CLAY (CL), medium plasticity Dark Hard Dry brown 65 SANDY CLAY (CL), medium plasticity, fine O 57 Slightly moist low plasticity Maist S 41 10 Slightly Medium Light SAND (SP), fine to medium moist dense brown O 25 Very Light SAND (SP-SM), fine to medium, trace of nondense gray plastic fines s 87 20 BORING TERMINATED AT 20.5" 25 30 35 PROJECT NO .: 80-241 **ELEVATION:** DATE DRILLED: 9-3-80 EQUIPMENT USED: 8" HOLLOW STEM AUGER WATER LEVEL: NOT ENCOUNTERED POWERINE REFINERY S STANDARD SPLIT SPOON SAMPLE (ASTM D1586) A DRY DENSITY (LB/CU FT) FIELD MOISTURE (% DRY WT) D FUGRO 2 1/2" DRIVE SAMPLE (ASTM D2216) LOG OF BORING NO. A-6 B BULK SAMPLE

NR NO RECOVERY

10-80

FIGURE A-6

THIN WALL TUBE SAMPLE

SAMPLE TYPE 10 20 30 40 DEPTH PENETRATION DENSITY/ 100 110 120 FEET COLOR SOIL TYPE 0 Dark SILTY CLAY (CL), medium plasticity Moist Hard brown 39 62 SANDY CLAY (CL), medium plasticity low to medium plasticity Very stiff 27 s 10 Medium dense SAND (SP), fine to medium Đ 23 SAND (SP-SM), fine, trace of non-plastic fines Gray Dense s 43 20 42, NR ٥ 25 BORING TERMINATED AT 25.0' 30 35 PROJECT NO .: DATE DRILLED: 80-241 EQUIPMENT USED: 8" HOLLOW STEM AUGER WATER LEVEL: NOT ENCOUNTERED POWERINE REFINERY S STANDARD SPI.T SPOON SAMPLE (ASTM D1586) A DRY DENSITY (LB/CU FT)

B BULK SAMPLE

T THIN WALL TUBE SAMPLE

D FUGRO 2 1/2" DRIVE SAMPLE

FIELD MOISTURE (% DRY WT)

(ASTM D2216)

NR NO RECOVERY

LOG OF BORING NO. A-7

10-80

FIGURE A-7

- SAMPLE TYPE 10 20 30 DEPTH PENETRATION DENSITY/ 120 90 100 110 FEET SOIL TYPE COLOR 40 SAND (SP-SM), fine with isolated silt (ML) Light brown Slightly Very dense lenses moist 61 D 45 fine to medium sand 63 50 BORING TERMINATED AT 49.5' 55 60 65 70 PROJECT NO .: 80-241 DATE DRILLED: 8-29-80 JGRO EQUIPMENT USED: 8" HOLLOW STEM AUGER WATER LEVEL: NOT ENCOUNTERED POWERINE REFINERY S ASTM DISSE) A DRY DENSITY (LB/CU FT)

THIN WALL TUBE SAMPLE (ASTM 01587)

8 BULK SAMPLE

D FUGRO 2 1/2" DRIVE SAMPLE

FIELD MOISTURE (% DRY WT)
(ASTM D2216)

NR NO RECOVERY

LOG OF BORING NO. A-8 (SHEET 2 OF 2)

10-80

FIGURE A-8

40 - SAMPLE TYPE :) 10 20 30 DEPTH IN. DENSITY/ PENETRATION RESISTANCE 90 100 110 120 SOIL TYPE FEET COLOR 0 Stiff SANDY CLAY (CL), medium plasticity Moist brown 0 20 SILTY SAND-SANDY SILT (SM-ML), no to Dry Hard Light low plasticity brown 37 10-SAND (SP-SM), fine to medium Dense 35 D SAND (SP & SP-SM), fine Very Gray dense s 59 20 ٥ 62 25 101/11" 30 ٥ 54 35 Light brown 57 40 PROJECT NO .: DATE DRILLED: 8-29-80 80-241 ELEVATION: ucro EQUIPMENT USED: 8" HOLLOW STEM AUGER WATER LEVEL: NOT ENCOUNTERED POWERINE REFINERY S STANDARC SPLIT SPOON SAMPLE A DRY DENSITY (LB/CU FT) D FUGRO 2 1/2" DRIVE SAMPLE FIELD MOISTURE (% DRY WT) LOG OF BORING NO. A-8

AB GENEROLD

BULK SAMPLE

THIN WALL TUBE SAMPLE (ASTM D1587)

10-80

(ASTM D2216)

NR NO RECOVERY

FIGURE A-8

(SHEET 1 OF 2)

10 20 30 40 -SAMPLE TYPE DEPTH PENETRATION RESISTANCE MOISTURE CONSISTENCY 120 90 100 110 FEET SOIL TYPE COLOR 0 SANDY CLAY (CL), medium plasticity Hard Moist brown 70 D ø 75 SILTY SAND-SANDY SILT (SM-ML), very Gray Dense fine sand D 59 10 Light brown SAND (SP-SM), fine to medium Dry \$ 15 44 45 s SANDY CLAY (CL) 20 -Hard BORING TERMINATED AT 20.3' 25 30 PROJECT NO .: 80-241 DATE DRILLED: 8-29-80 EQUIPMENT USED: 8" HOLLOW STEM AUGER WATER LEVEL: NOT ENCOUNTERED POWERINE REFINERY STANDARD SPLIT SPOON SAMPLE A DRY DENSITY (LB/CU FT) D FUGRO 2 1/2" DRIVE SAMPLE FIELD MOISTURE (% DRY WT) (ASTM D2215) LOG OF BORING NO. A-9

NA NO RECOVERY

10-80

FIGURE A-9

T THIN WALL TUBE SAMPLE (ASTM D1587)

B BULK SAMPLE

FIGURE A-10

5-78

β

THIN WALL TUBE SAMPLE (ASTM 01587)

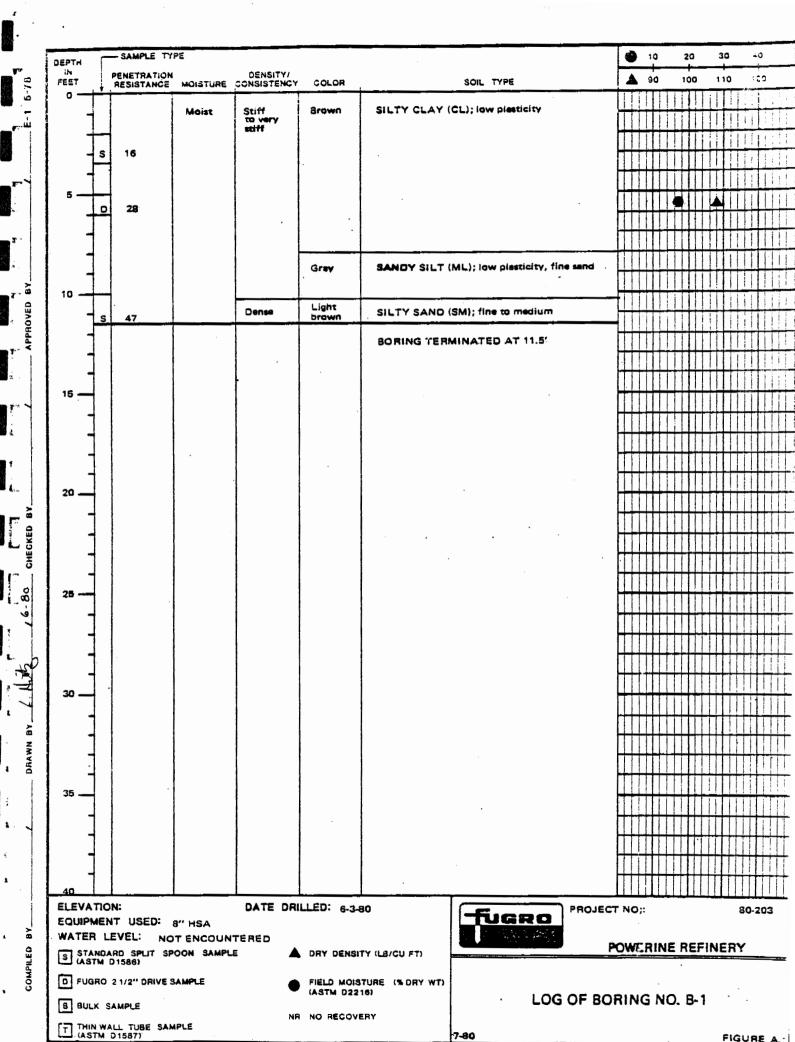
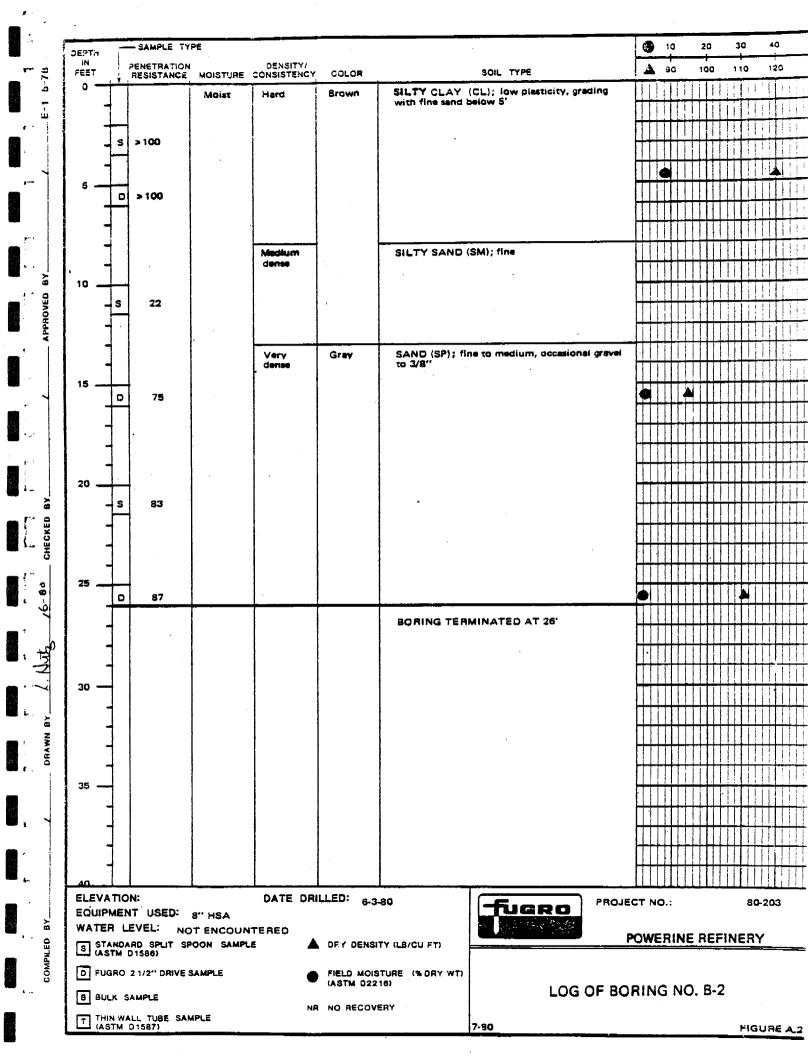


FIGURE A



DEPTH	SAMPLE T	YPE				L	3	10	<u></u>	_	20	_	_	30		40	÷	-
IN FEET	PENETRATIO	N MOISTURE	DENSITY/	COLOR	SOIL TYPE	1,	À	9	0	-	100	٥	•	110	_	12	20	c
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4		Moist	Firm to stiff	Brown	SILTY CLAY (CL), Now processory	H	+	+	۲	1	#	$\dagger \dagger$	+	+	.	\Box	ſ	
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4				ĺ		П	П	Τ,	\prod		\prod	\prod	\prod	\prod_{i}	1		Ĺ	, .
4			Stiff	Gray	SANDY SILT (ML); low plasticity, fine send		\prod	7	Ī	T	\prod	П	Ţ	T		T	1	
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<u></u>			Very dense	Gray	SAND (SP); fine to medium	· H	+	+'	#	#	#	#	4	#	\perp	Щ	+	ř
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+	B	+	+	-		+	+	十	#	+	#	#	#	+	一	\forall	t	,
4				1	BORING TERMINATED AT 26'	H	+	+	#	+	#	#	+	H	#	H	+	, ŧ
4	1		1			H	4	++'	#	+	#	#	4	#	4	\mathbb{H}	+	
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35	1		,			+	+	+	+	+	++	#	+	+	1:		t	
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40	·		'				1	<u>ا</u> آ		$\prod_{i=1}^{n}$		$\left[\right]$,]]	\prod	\prod	\prod	ĺ	
ELEVAT	TION:		DATE DR	ILLED: 6-4	4-80 PROJE	-CT I	10 —	:	يحلد		<u></u>	ــــــــــــــــــــــــــــــــــــــ	<u> </u>		80-	<u>ٺ</u> 2(, ς	_
EQUIPM	MENT USED:	8" HSA			Jugro	••	٠.	•							-		,	•
WATER	R LEVEL: NO	T ENCOUNT	rered			90	AII	==	110	•5	91	< E	.18	ue i	5V	,		
	NDARD SPLIT	SPOON SAMPI	LE 🛕	A DRY DENS	SITY (LB/CU FT)	POV	<u> </u>	<u>.h</u>	<u> </u>	<u>=</u> ′	<u> </u>	=	<u>IN</u>	=	<u>()</u>	_	=	;
S (AST	"M 01586)				ı													

LOG OF BORING NO. B-3

7-80

NR NO RECOVERY .

B BULK SAMPLE

THIN WALL TUBE SAMPLE (ASTM D1587)

FIGURE A.3

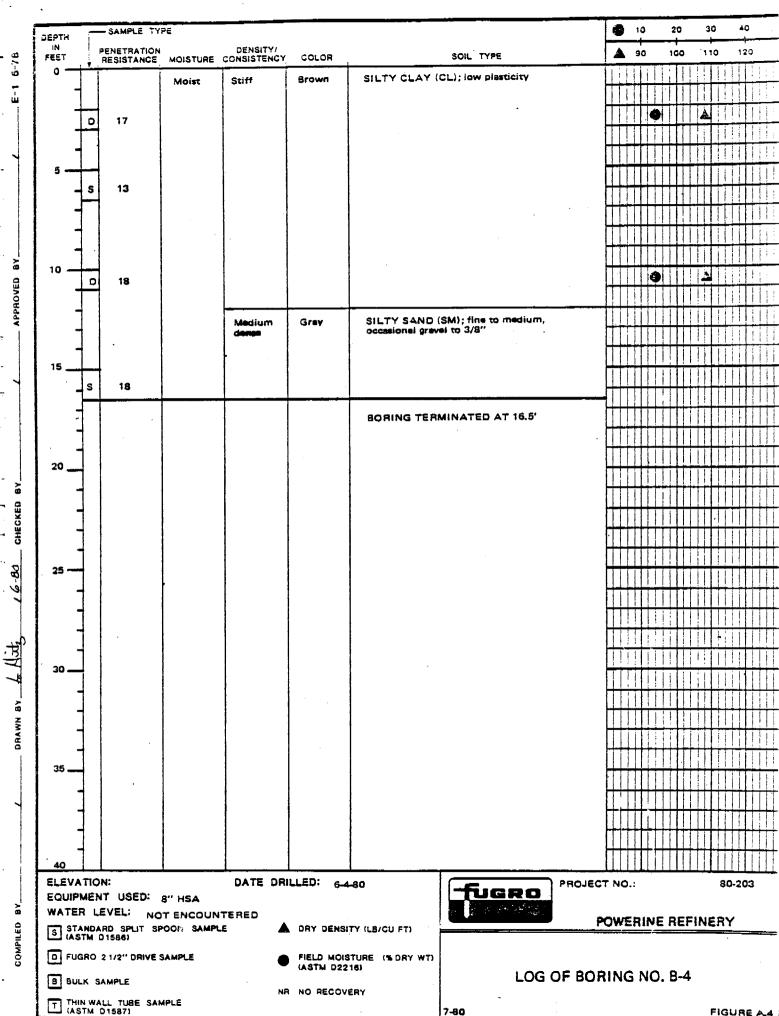


FIGURE A4

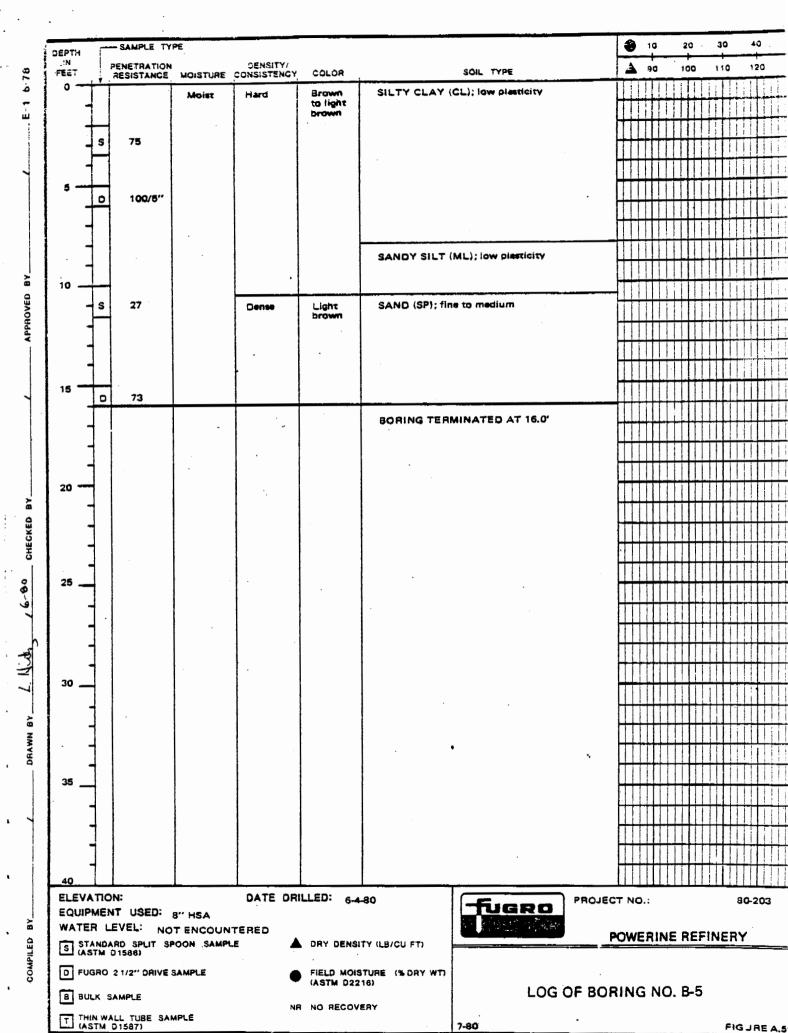


FIG JRE A.5

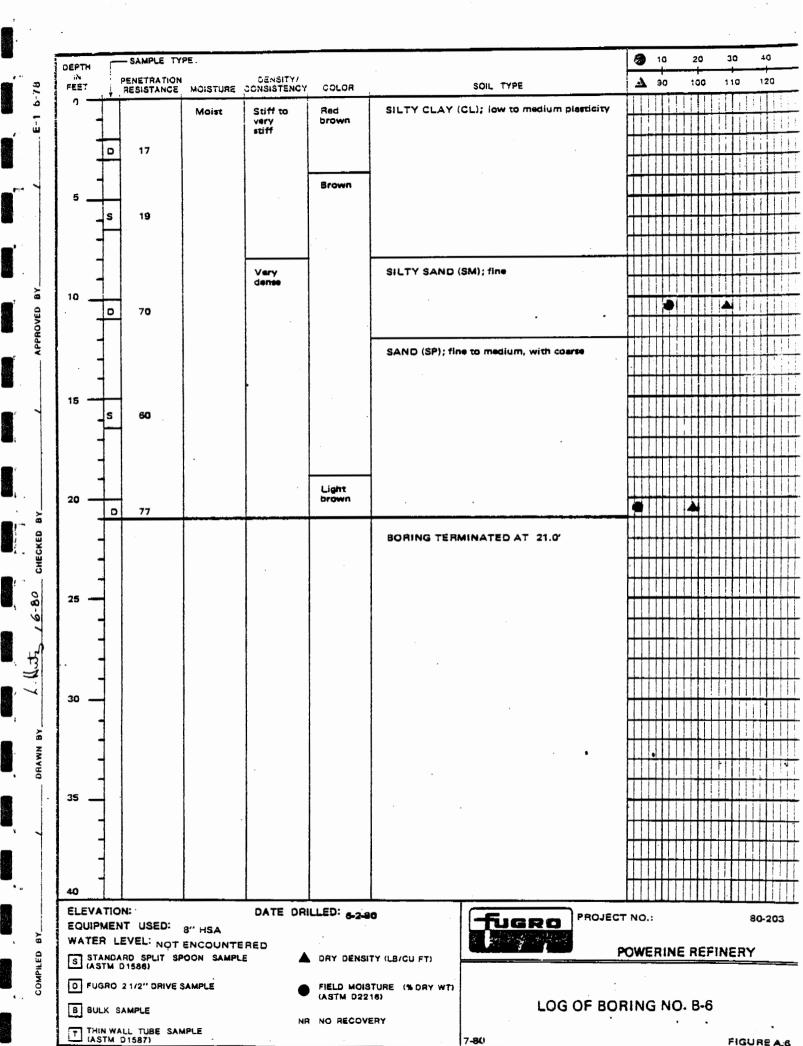
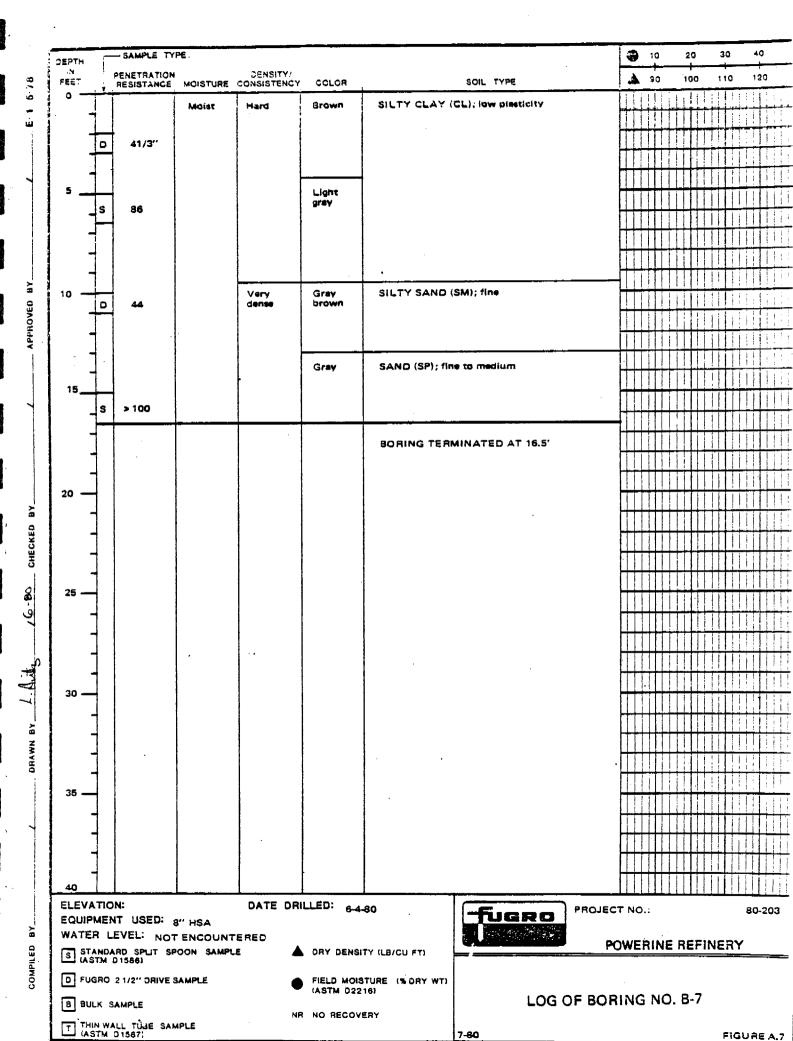


FIGURE A:6



7-80 FIGURE A.7

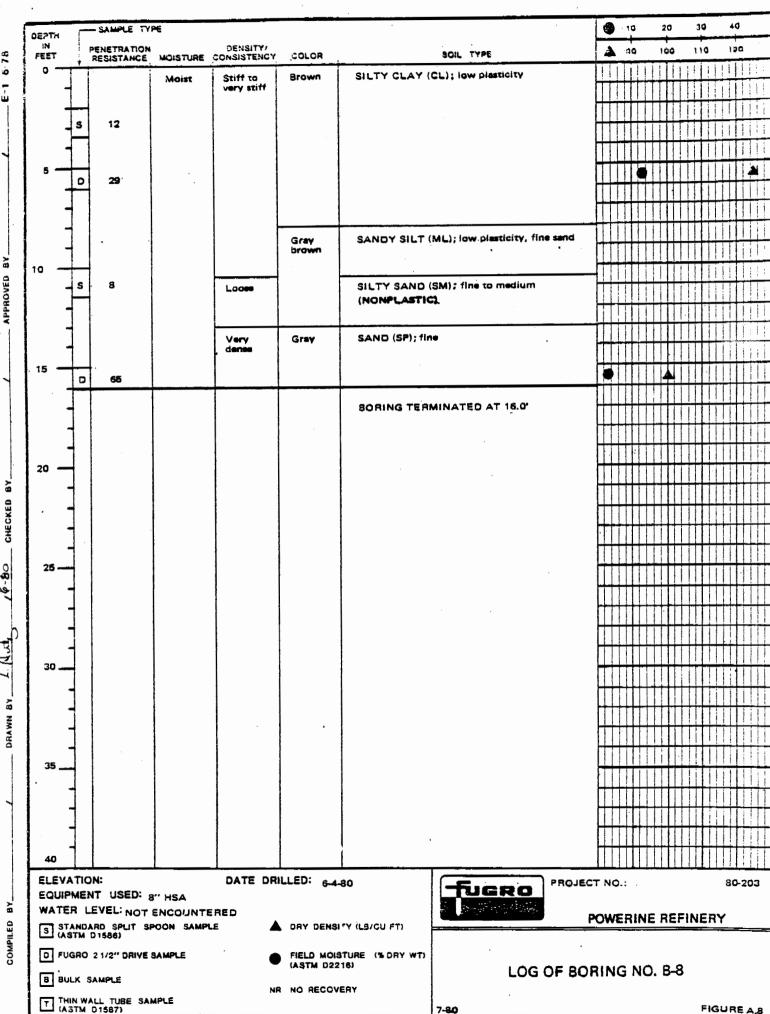


FIGURE A.8

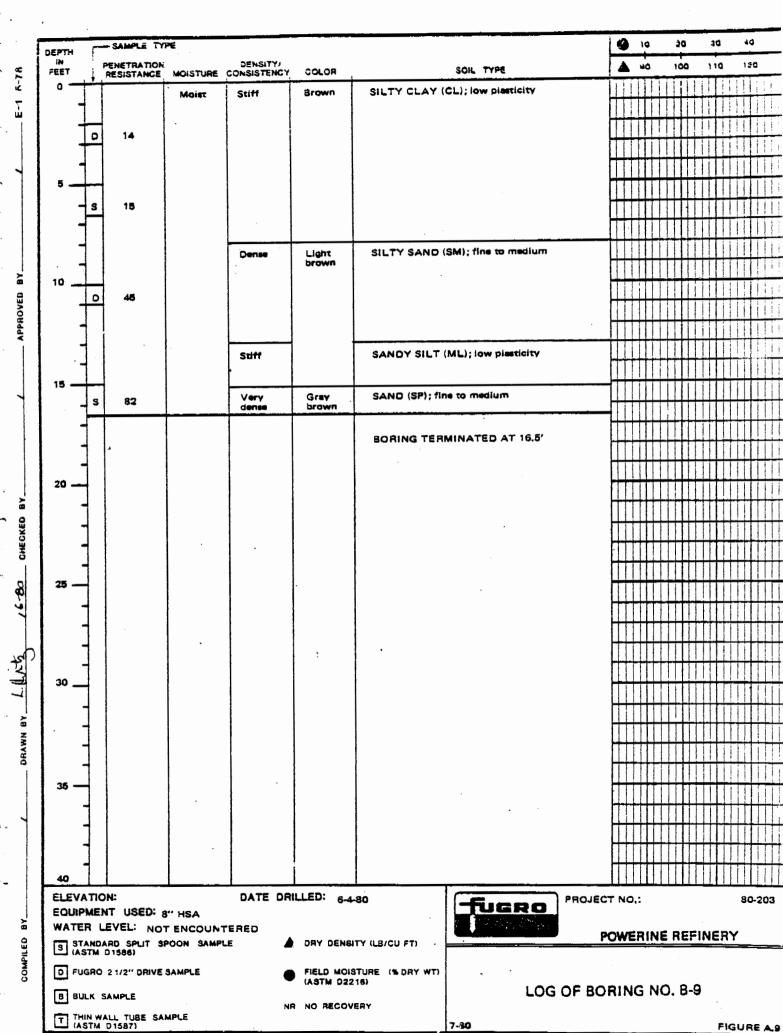


FIGURE A.S

7-30

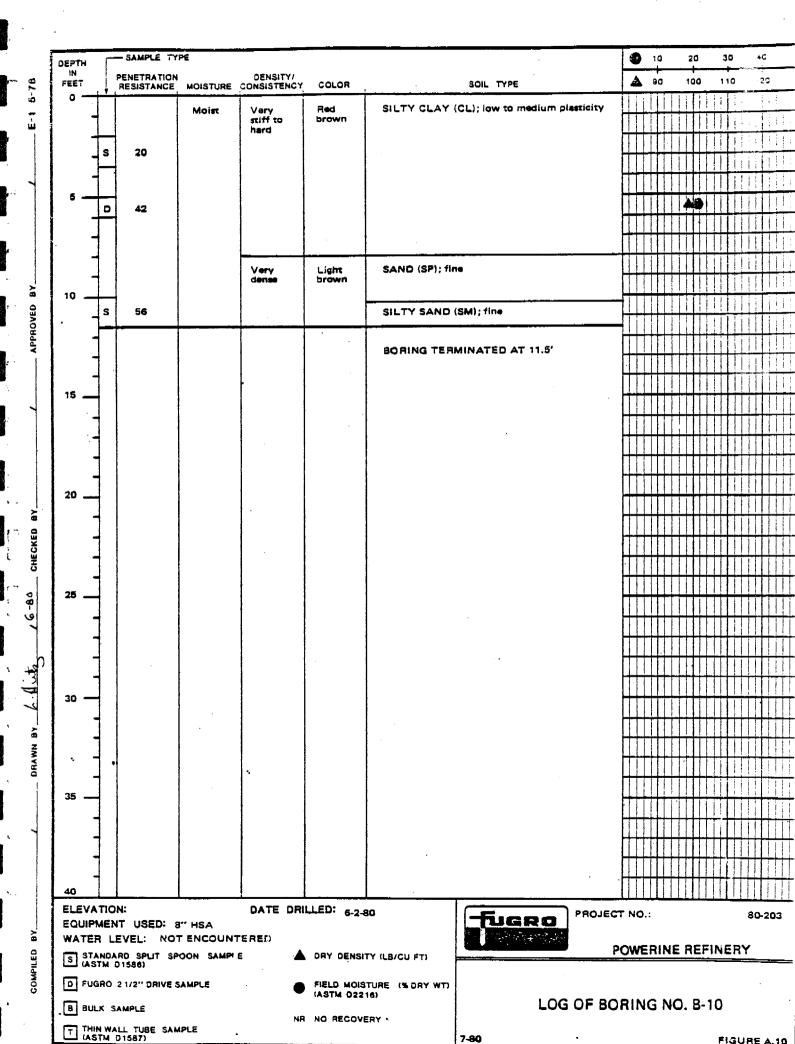


FIGURE A.10

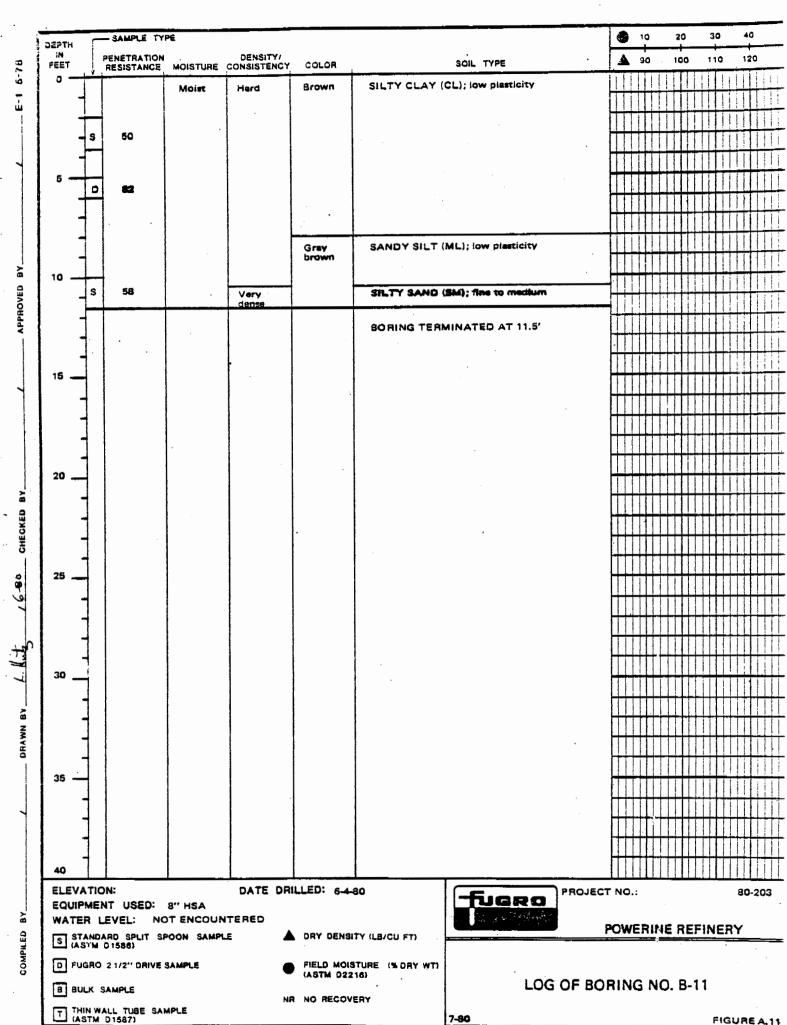


FIGURE A.11

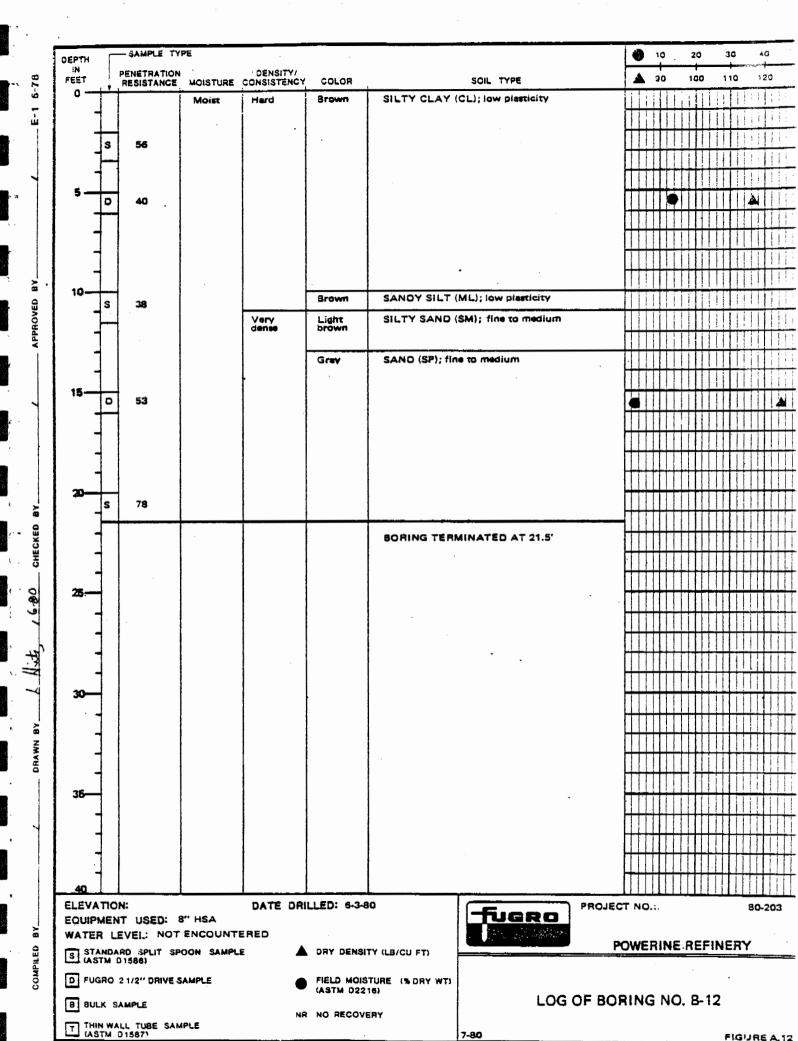


FIGURE A.12

7-80

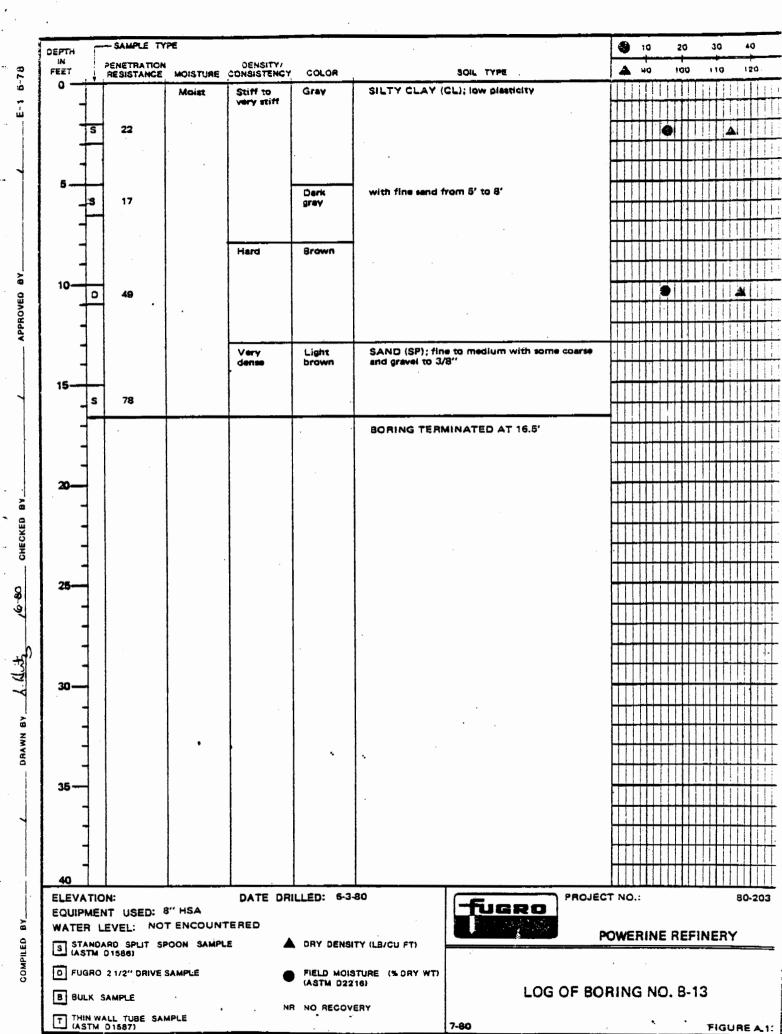
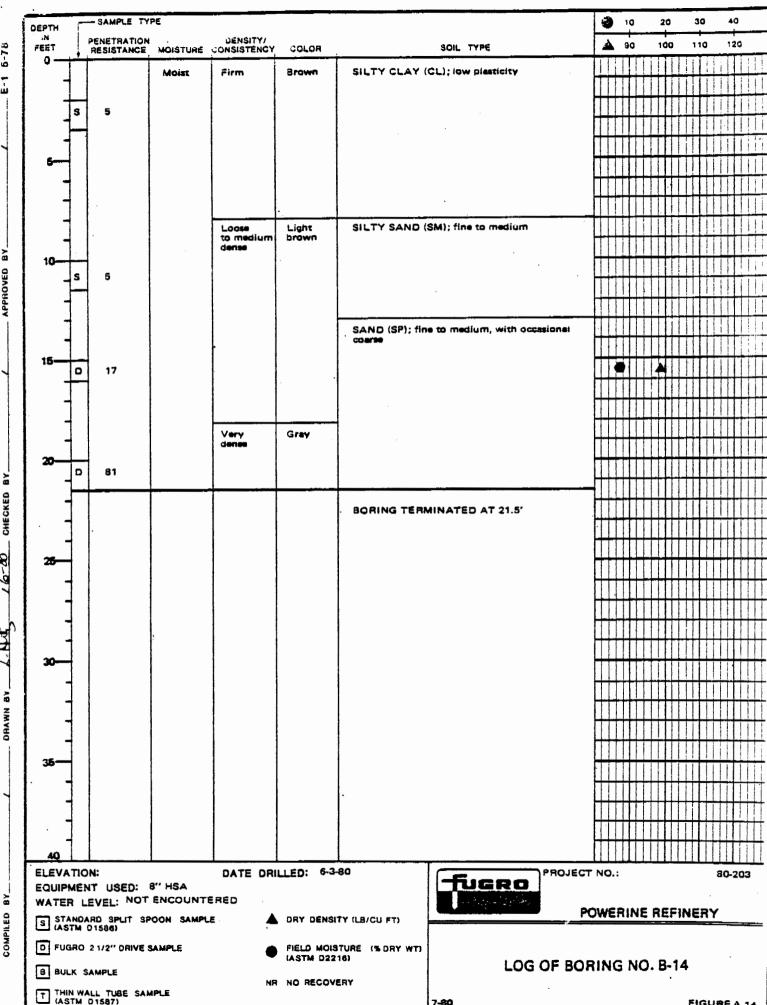


FIGURE A.1:

7-80



FIGUREA 14

DEPTH	- SAMPLE TYP	E					•	10		20	,	30)	4		֡
FEET	PENETRATION RESISTANCE	MOISTURE	DENSITY/	COLOR		SOIL TYPE	A	90		10	٥	11	0	†	:	2
9-1-	ALUIQI ANGE		Very	Brown	SILTY CLAY !	CL); low plesticity			il			Hi		İ		-
. 4		Moist	stiff to	SIOWII	SIC. FCCAT	32/, 10th prestrainty			Tİ	П	\top	Ш	П	П	,	-
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+	1								11		11				•	I
-					SANDY CLAY	(CL); low plasticity, fine to		\parallel		Ħ	Ħ	Ш	П	j	•	Ì
5			Firm		medium send	familian himsiniti illa 16		\parallel	+	T	11		T	Ì		
4								$\dagger \dagger \dagger$	+	$\dagger \dagger$	#	H	$\dagger \dagger$	1		
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								$\dagger \dagger \dagger$	$\dagger \dagger$	$\dagger \dagger$	$\dagger \dagger$	111	Ħ			
4				Gray	SILTY CLAY (CL); medium plasticity		$\forall \exists$		Ħ	Ħ					l
10	-			Gray	312.1 022.1	out, modition productly		+++		╫	1	H	Ħ	+		
40	5						1	Н	H	+	Ħ	Н	T	1		
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4			to very		SAND (SP); fine	क्षायायम		++	\forall	+	H	H	$\dagger \dagger$	+	4	
15S 4	-		dense				1	H		H	+	H			1	
	47						H	+	H	H	H		H	-		
-	7	,						H	H	+	+	H	+	+		
4	-		-				1	H	+	H	H	+++	+	H	-	
-							-	+		H	+	H	+	1	ļ	
20	74				with clay lens a	t 20'	1	++	+	+	+	#	1	1		
-	/							+	+	#	+		1	H		
-					SORING TERMINATED AT 21.0	\mathbb{H}	+++	+	H	+		╫	H			
4								+	+	H	+	Н	11			
4								H	+	H	+	₩	+			
25								H		+	+	₩	+	1		
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4								+	+	+	#	₩	+	H	-	
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30							.	\prod	+	\mathbf{H}	#	11	#	H	1	
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40								Ш			Ц	Ш			-	
	ON: ENT USED: 8' LEVEL: NOT			LLED: 6-3-	-80	Tugeo	ECT NO.							80	_	
	DARD SPLIT SPO F D1586)			DRY DENSI	ITY (LB/CU FT)		POWE	HIV	ΙE	RE	FI	NE	RY		=	
_	0 21/2" DRIVE S			FIELD MOIS	STURE (% DRY WT)											
=		LOG OF BO	ORING	N	Ο.	B.	.15	;								
B BULK			МА	NO RECOV	ERY	2000, 0			٠.	_						
THIN Y	NALL TUBE SAM 4 D1587}	PLE				7- 80							GU:			

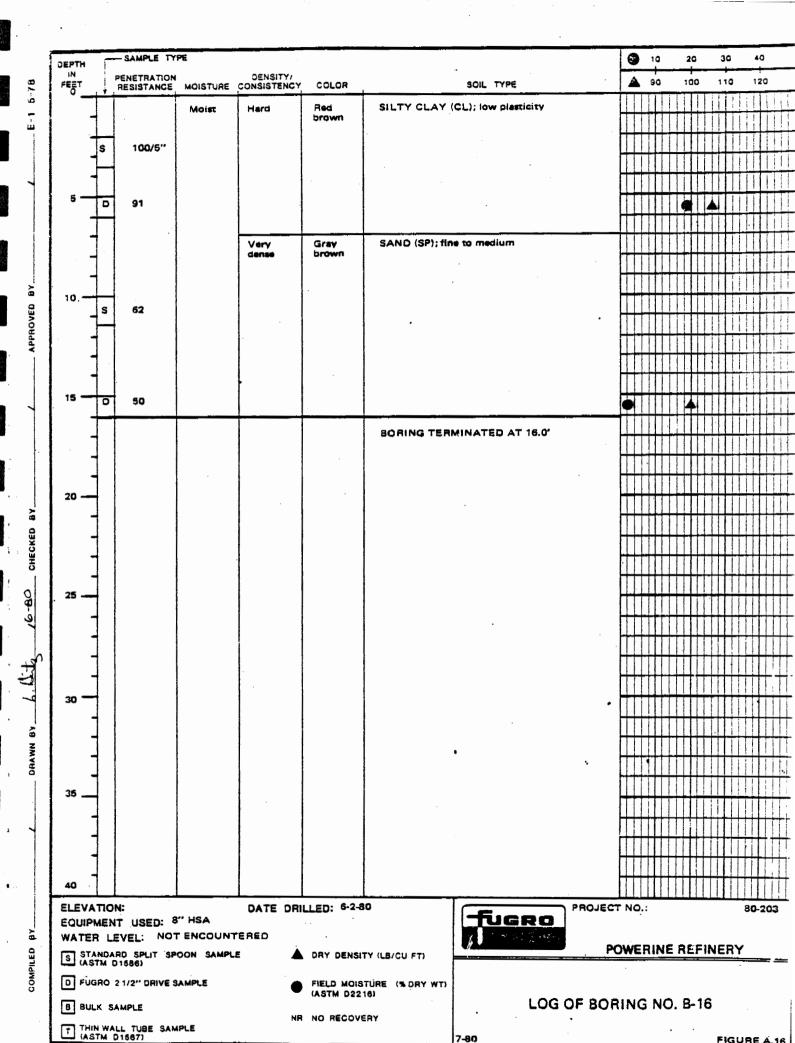


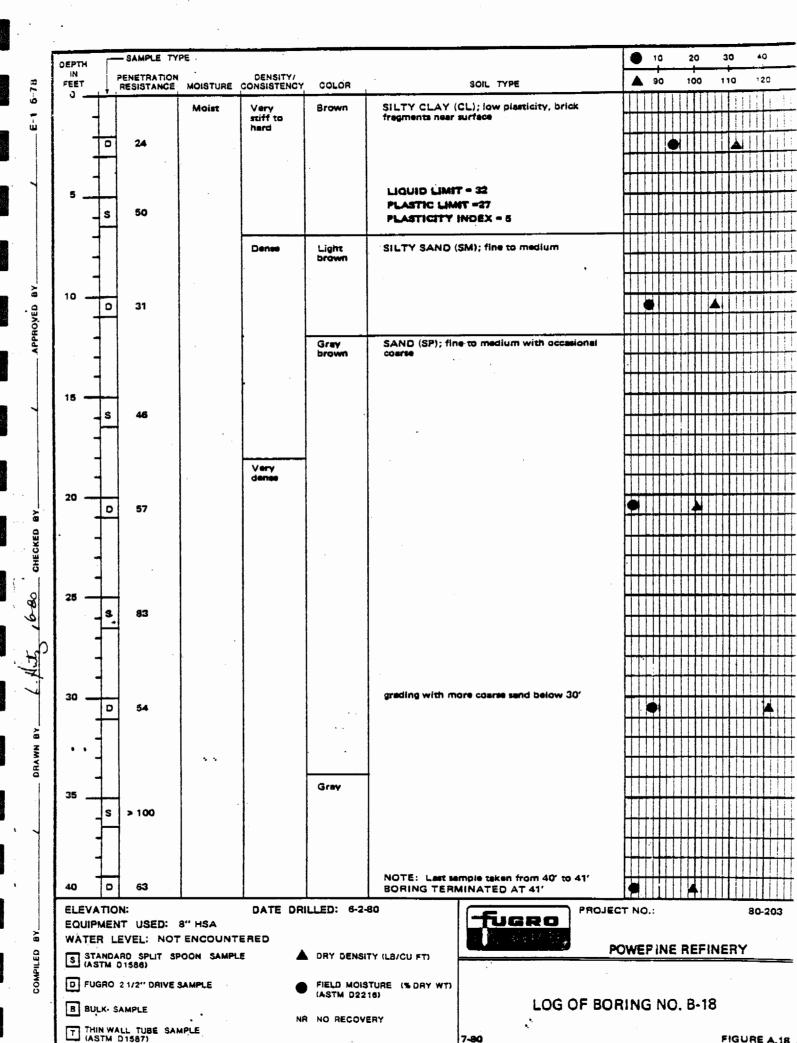
FIGURE A.16

EPTH	SAMPLE	TYPE					•	10	,	- 4	٥	_	30		+0	
IN FEET	PENETRA	TION NCE MOISTURE	DENSITY/ CONSISTENCY	COLOR		SOIL TYPE		90	,	10	, 00	,	10		.20	3
°-†	<u> </u>	Moist	Very	Red	SANDY CLAY	(CL); low plasticity, fine send							Ti			; ;
+		MOISE	stiff	prown											j	
+	D 12								•							-
+														1		
+													I			Ĺ
⁵┪	D 16								•				II			-
+	_										1					I
+														11		J
4			Herd	Blue	SANDY SILT	ML); low plasticity										
٠			neru	gray												
\rightarrow	D 53										A				İ	
+													\prod			-
4									\prod							
1						·							\prod			-
_			Dense	Gray	SAND (SP): fin	e to medium, with occasional							\prod			
5—	D 45			-,	coarse	•	•									
+						•							I			•
†					gravel at 17'											•
_			Very			•										
_ 1			dense													
°-	D 55												\prod			
†														П		•
1													I			
_																
_ 1																
5	D 76												\prod			
1			·										\prod		\prod	
7					gravel at 28'								\prod			•
1			•	• •	9.270, 21 20											
_ 1													\prod	\prod		
30	D 94													\prod		
1																•
]									\prod		Ш			I		
]																
35																-
	D 100	NR			grading coarser	at 36"										
]	D 99										\prod_{i}					-
							\coprod	Ш	Ц		Щ	\coprod		Ц	Ц	1
					NOTE: Last se	imple taken from 40' to 41'	Ш	Щ	\coprod		Ш	\parallel	\coprod	Ц		1
40	D 90					MINATED AT 41'										
ATER	ENT USE	NOT ENCOUN	TERED	LLED: 5-21		fugeo	CT NO		ואו	= =) F	- 1 1	ıF		0-2	10
S STAI	NDARD SPLIT M D1586)	SPOON SAMPL	.E 🛕	DRY DENSI	ITY (LB/CU FT)			-11		_ (1	=			-		=
_		IVE SAMPLE			STURE (% DRY WT)											

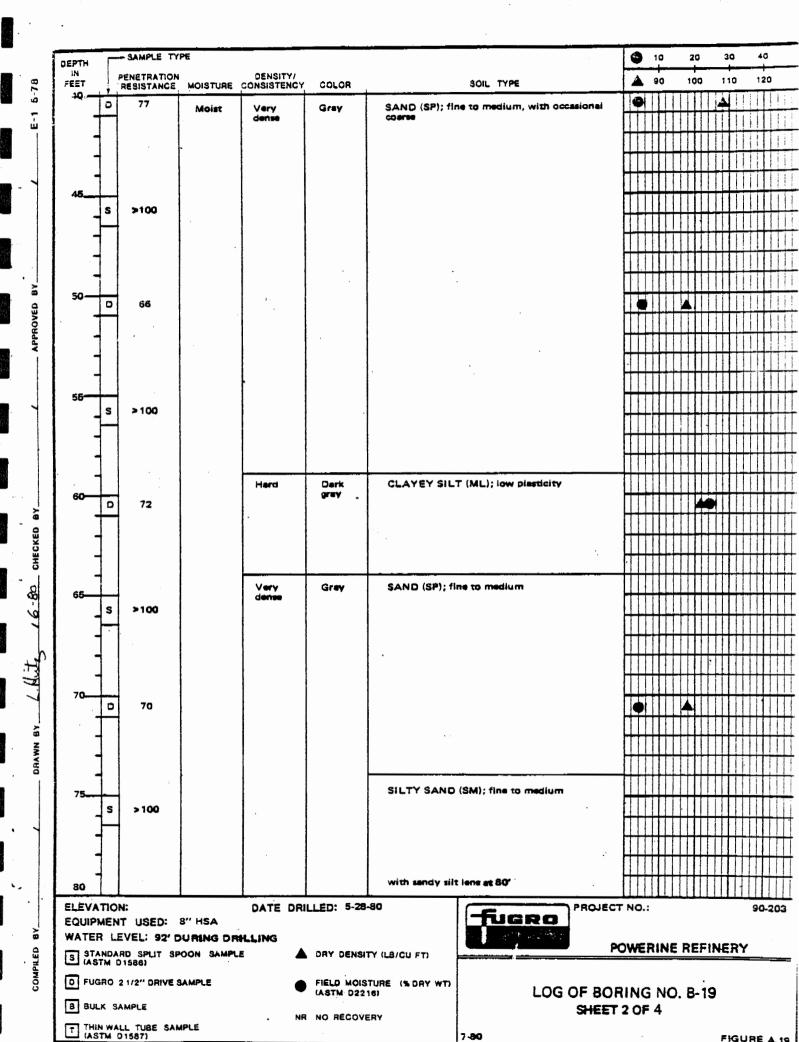
B BULK SAMPLE

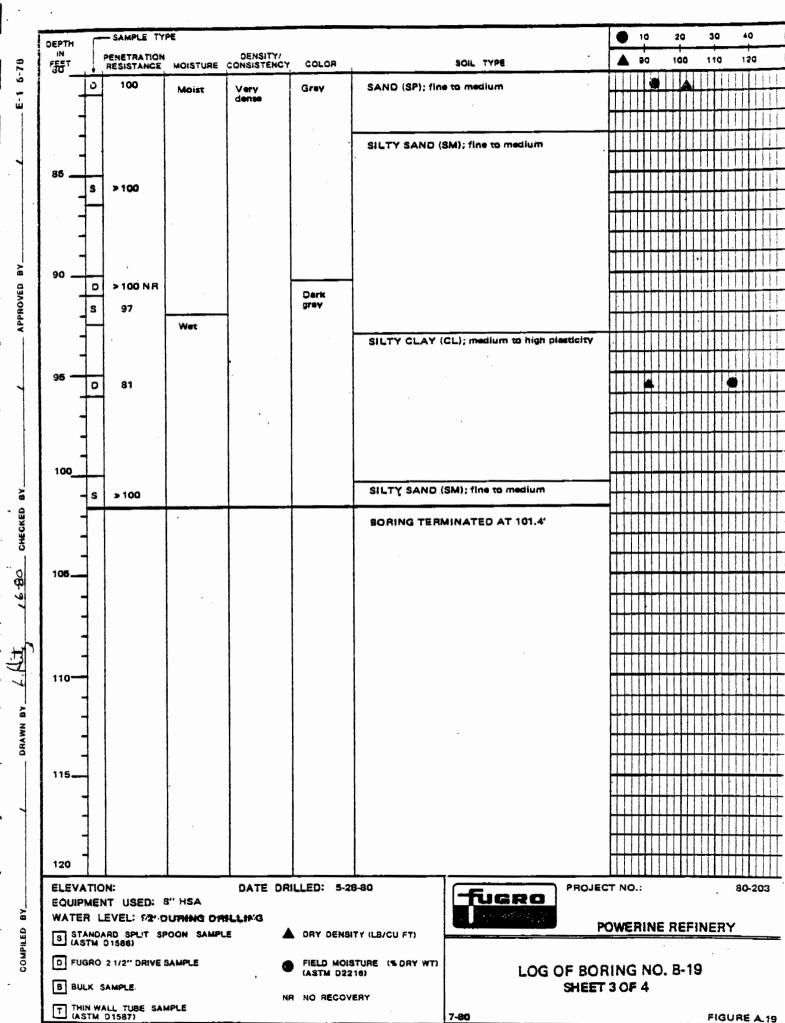
THIN WALL TUBE SAMPLE (ASTM D1587)

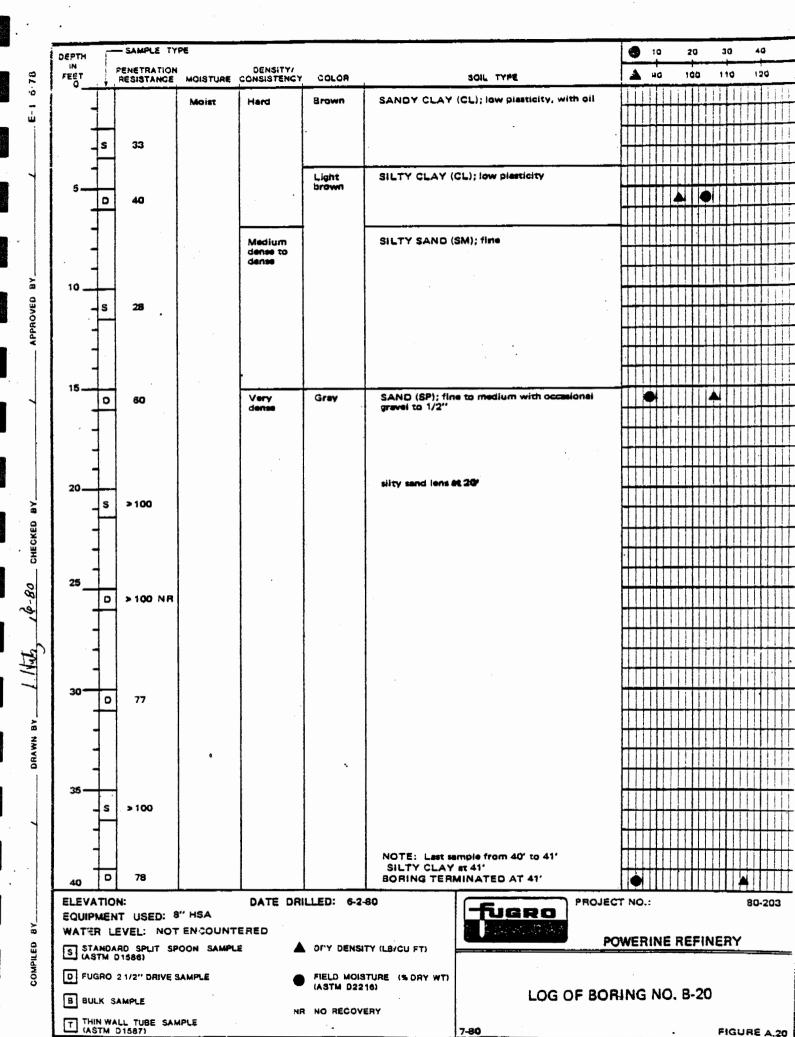
FIGURE 4.17

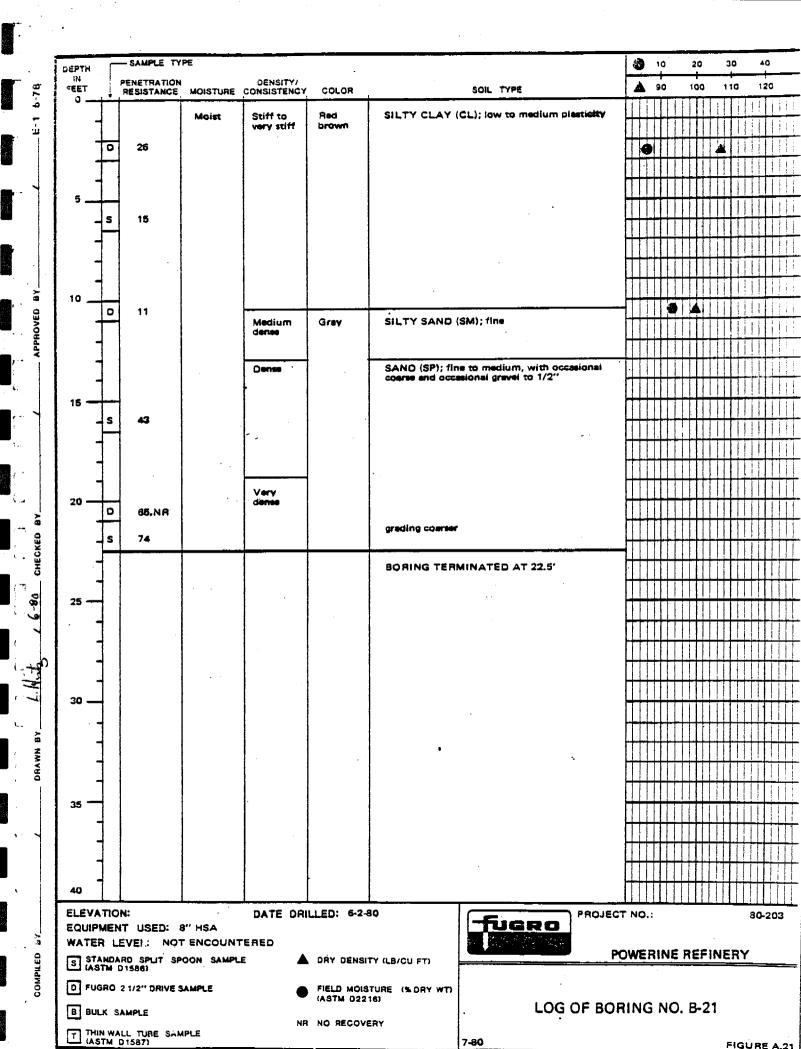


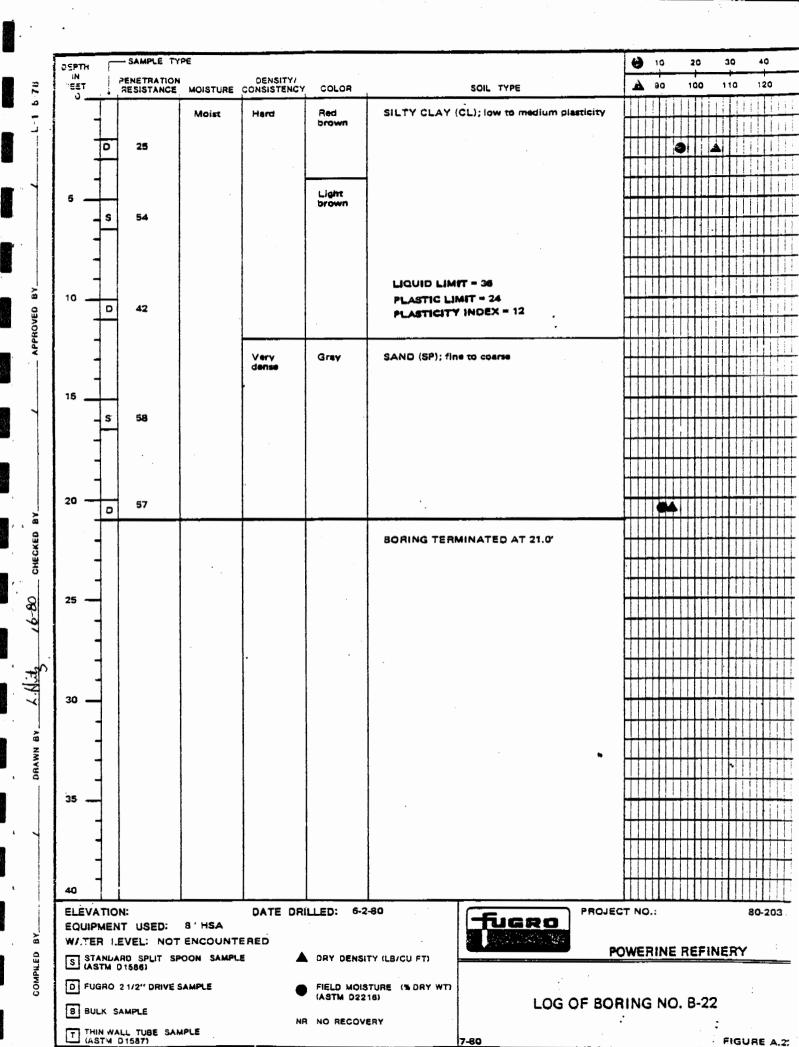
EPTH	- SAMPLE TY	PE					•	10	_	20		30)	4	40
EET	PENETRATION	MOISTURE	DENSITY/ CONSISTENCY	COLOR	SOIL TYPE		Δ	90		100	,	110	•	7	20
o 		Moist	Stiff to	Red	SANDY CLAY (CL; low plastici	ty, fine sand		Ш	Ш	\coprod		\prod			Ţ
7	j l		very stiff	brown				Ш		Ш				Ц	1
Р	15							\coprod	1	M	4				1
1	1						Ш		Ш	Ш	Ш	Щ	Ш		1
5 <u> </u>								Ш	Ш	Ш	Ш	Щ	Ш	Ц	1
s	29						Ш	Щ	Ш	Ш	Ц	Щ	Щ	Ц	1
<u> </u>	1		,			.•	Ш	Щ	Ш	Щ	Щ	Щ	Щ	Ц	1
				•			Ш	Щ	Ш	\coprod	4	$\!$	$\!$	H	1
_							+++	Щ	Ш	Щ	4	#	\coprod	\coprod	4
10				Brown	SANDY SILT (ML); low plastici	ty, fine send		Щ	Щ	Щ	Щ	4	Ц.	H	-
10	25						\coprod	#	4	1	\perp	#	#	H	4
4							444	Щ	Ш	Щ	\coprod	4	\perp	11	4
4			Very dense	Light brown	SAND (SP); fine to medium			\coprod	Ш	Щ	4	$\!$	oxplus	\coprod	+
4				to brown				#	₩	H	+	+	#	H	+
15	4 1						##	#	H	#	+	#	#		j
s	63				•			#	₩	H	+	#	#	$\!$	1
4							HH	₩	\mathbb{H}	\mathbb{H}	\mathcal{H}	₩	₩	otherpoonup	1
4							##	₩	++-	┍╂┤	$+\!+\!$	#	${\mathbb H}$	$\!$	1
4							 	₩	₩	H	+	╫	╫	H	1
20	-	•						₩	H	H	+	#	₩	╁	1
10	40							₩	H	H	+	#	+	\dashv	1
4							 	₩	H	H	+	₩	₩	H	1
4	1				•		 	╫	Н	H	+	+	+	+	1
4							HH	H	H	H	+	$\dagger \dagger$	+	H	1
25	-						H + + + + + + + + + + + + + + + + + + +	${\sf H}{\sf T}$	Ħ	\forall	$\dagger\dagger$	$\dagger \dagger$	$\dagger \dagger$	İΤ	1
- s	84							H	Н	H	\forall	$\dagger \dagger$	1	H	1
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- 1								$\dag \uparrow$	П	#	\forall	$\dagger \dagger$	${\mathsf H}$	İ	1
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30 - 0	86,NR							П	П	\prod	П	\prod		T	1
1	1							Ш	Ш	П	\prod	\prod		T	1
]				Gray				\prod	\prod	\prod	\prod	\prod	\prod		1
]								Ш		\coprod	\prod	Ir			
35					grading with coarse send and occ	asional		Ш		\coprod		\coprod			
s	76				gravel to 1"					Ш	Ш				
<u> </u>	-						Ш	Ш	Ш	Щ	Ц	Щ	Ш	Ш	
4							Ш	Ш	Ш	Щ	Щ	Щ	Ш	Ш	
4							\coprod	Ш	Ш	4	\coprod	$\!$	Ш		1
40	<u> </u>							Ш		\coprod	\coprod	Ш	Ш		
WATER I	NT USED: 8 Level: 92', d	NG DAMEU	ILLING	LLED: 5-28	TUGR	* jes	OWE		<u>e f</u>	<u>≀E</u> !	FIA	4E		80	
	ARD SPLIT SP 01586)		_		-							-			
B BULK	2 1/2" DRIVE S SAMPLE	AMPLE	• na	FIELD MOIS (ASTM D22)		OG OF BO			٥.	В-	19	İ	•		
THIN W	ALL TUBE SAM D1587)		ME	. HO RECOVE											

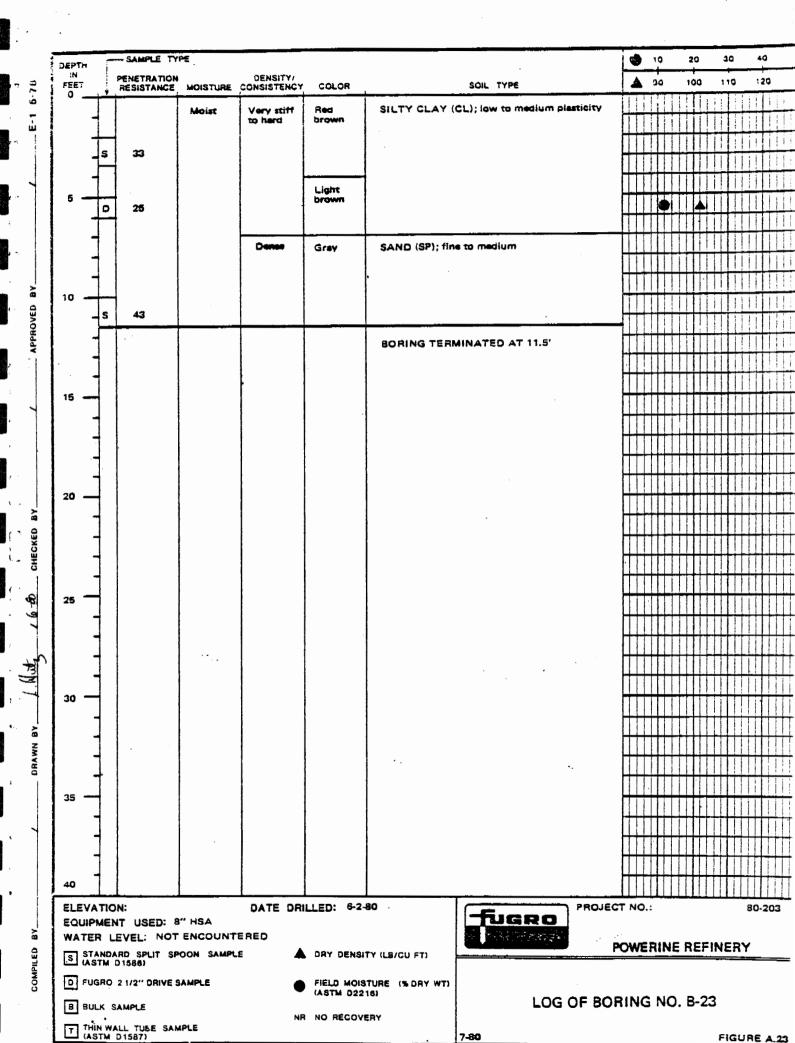


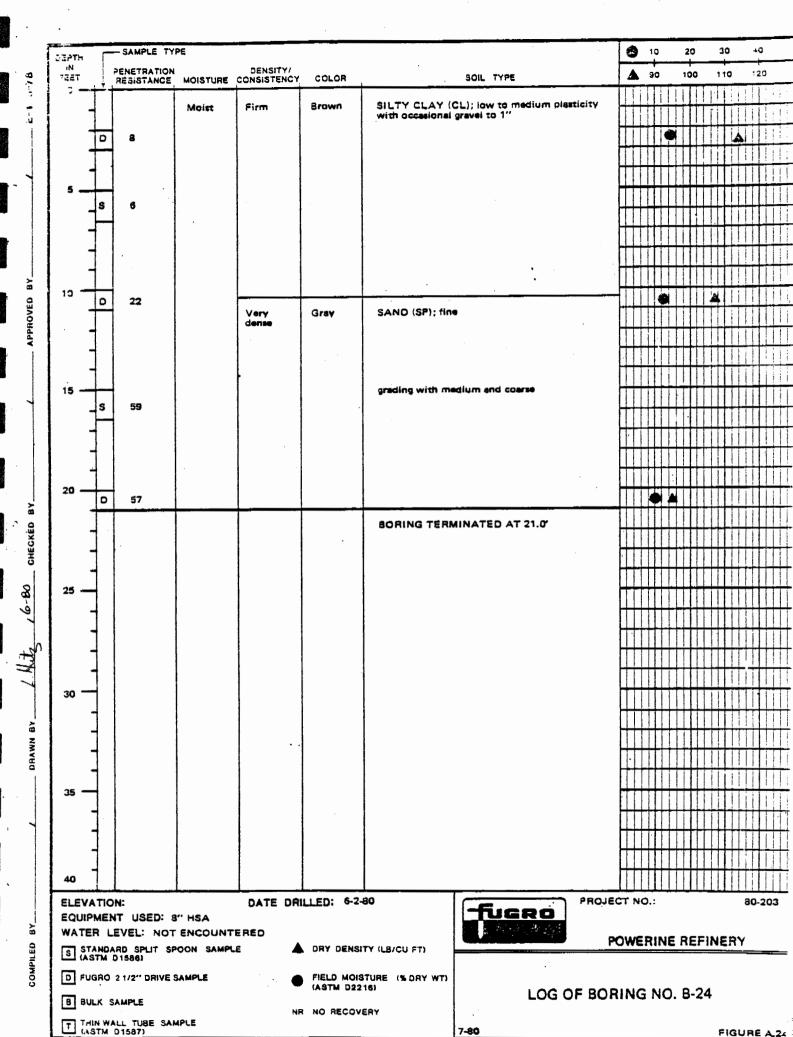


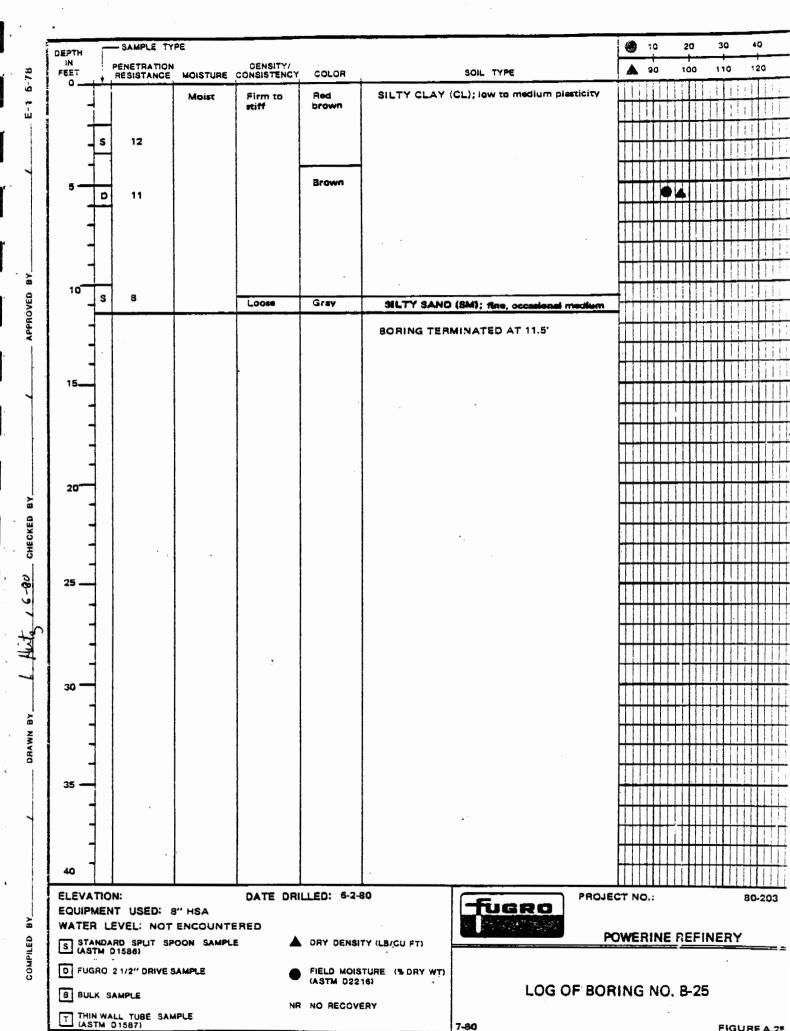






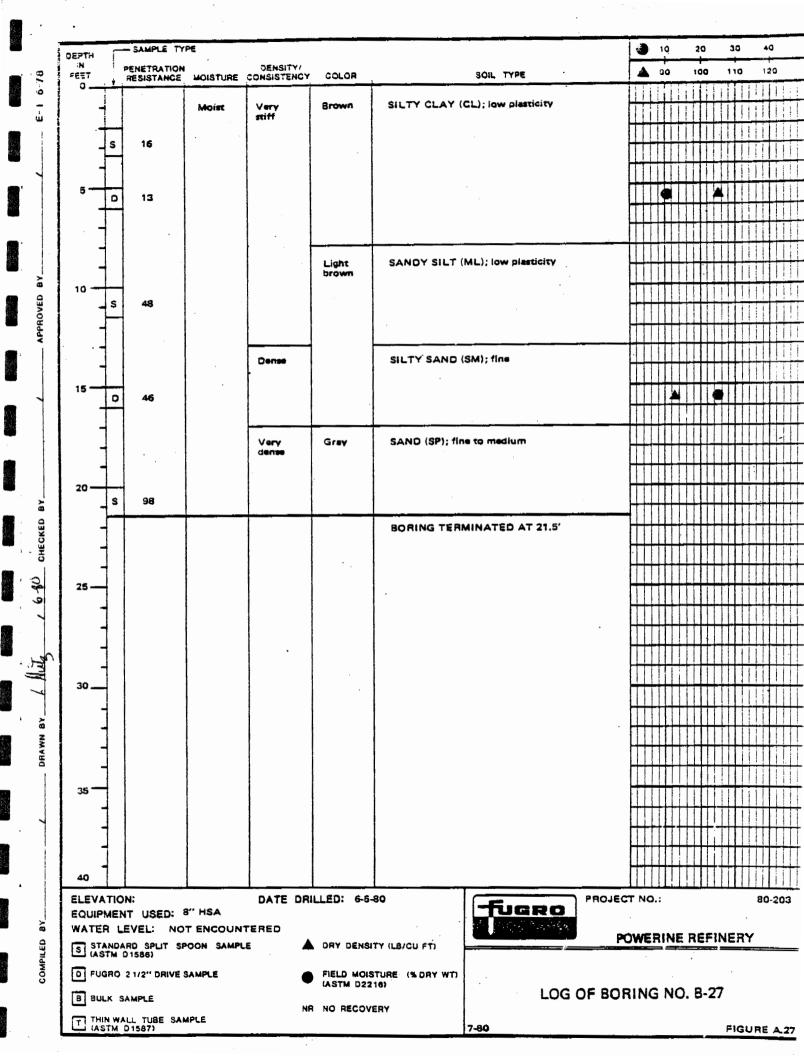






DEPTH		- SAMPLE TY	PE						1	<u> </u>	15	,		20		3	٥		10	_
PEET	1	PENETŘATION RESISTANCE	MOISTURE	DENSITY/ CONSISTENCY	COLOR		SOIL TYPE			_	9	٥		100		11	o		20	د
3 -	<u> </u>	HESIGIANCE				eu - 74 -61 -114			П	1					;	ij	į,	and and the	-	•
ال		,	Moist	Stiff	Brown	SILTY GLAY	CL); low plasticity		H			1	Ì			П	Т	; ;	Ī	,
_		45							H	H	$\dagger \dagger$		3	+	+		11	A	1	•
_	0	19							H	H	H	H			\dagger	1		Ť	t	
_]									+	H	┧	+		+	\parallel		Ħ	11	1	•
5 —	\sqcup								+	H	H	\parallel	+	+	+	H		11	t	•
_	s	21		1	11-5-	CANDUCT -	ML); low plesticity, fine	4000	+	H	H	H	+	+		\mathbb{H}	+	+	+	
	П			Very stiff	Light gray	SANDY SILI	ML); IOW plasticity, line	20110	+	Н	+	+	+	+	Н	+		╫	+	
_									+	H	H	+		+	+	\parallel	1	+	+	
_									+		\parallel	+	+	+	ŀ		- 1	11	+	
10 -									4	П	1							11	+	
_	٥	34					,		\parallel	H	+	+	4	Щ	#	4		11	+	•
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15 —									#	\sqcup	4				İ		4	1	+	
	s	42				SAND (SP); fir			1	Ц	1	Ц				Ш	4		1	ŗ
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7						BORING TER	MINATED AT 16.5'		\parallel		Ц						Щ	Щ	1	
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ELEVA	TIO	N:		DATE DRI	LLED: 6-5-	B O		PROJEC	T N	0.	:	11	1,1	Ш	П	1.	Ц	80	L	1
EQUIPM	MEN	NT USED: 8					TUGRO			٠.	•							30		•
		EVEL: NOT					· 多型的电影	Pr	ÓV.	/F	RI	NF	2 6	F	FI	u =	R	,		
S STA	NDA TM	LRD SPLIT SP D1586)	OON SAMPLE	E ▲	DRY DENSI	TY (LB/CU FT)										==	===	_	=	;
D FUG	RO	2 1/2" DRIVE S	AMPLE		FIELD MOIS	TURE (% DRY WT)														
B BUL	K e	AMPL F		•	(ASTM D22	16)	LOG C	F BOF	RIN	١c	: 1	NC).	B-:	26	i				
ے۔ ت				NR	NO RECOVE	ERY			, , ,	•	- 1		-							

THIN WALL TUBE SAMPLE (ASTM 01587)



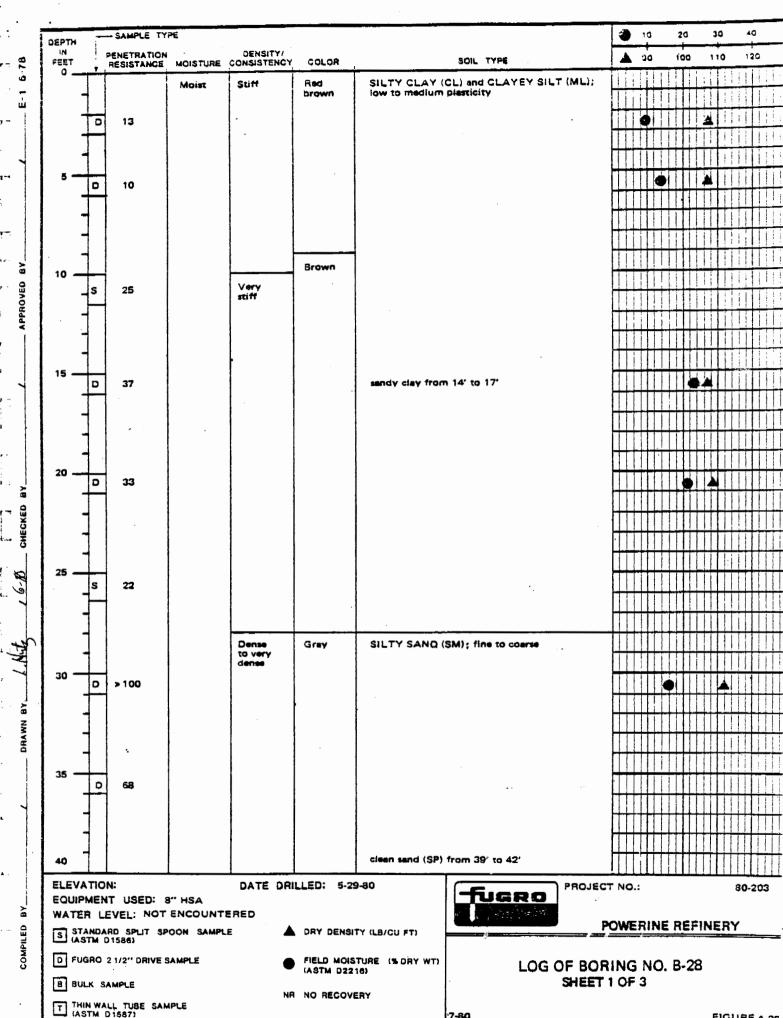
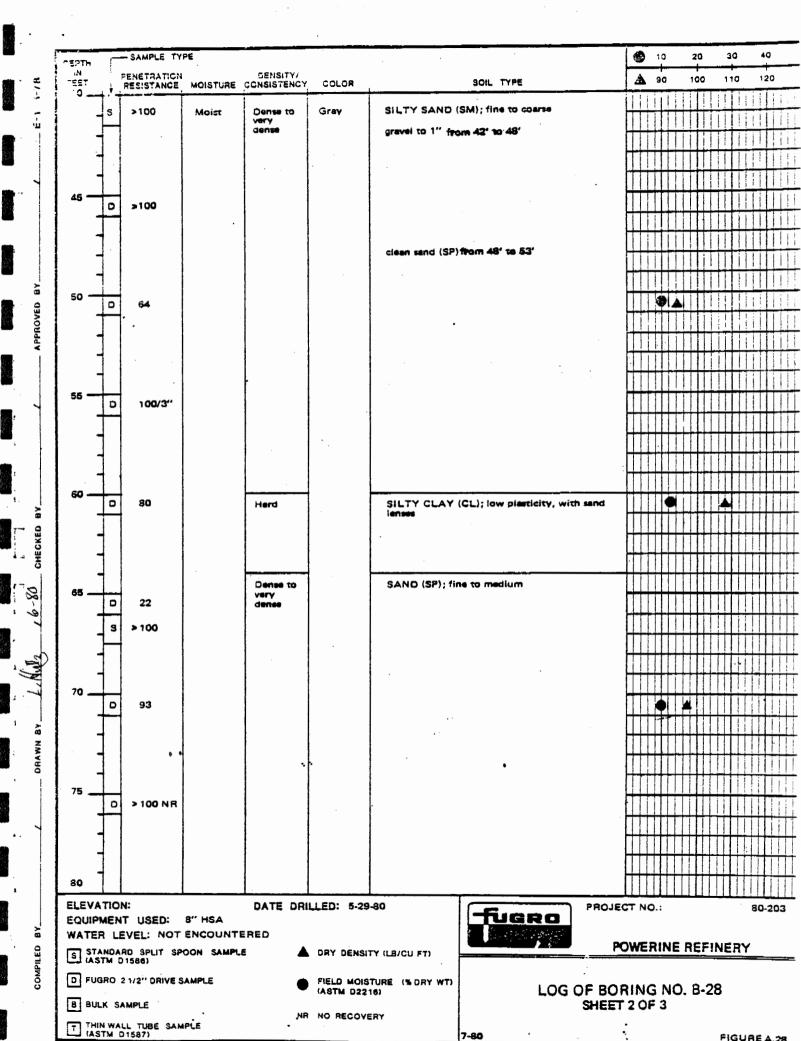
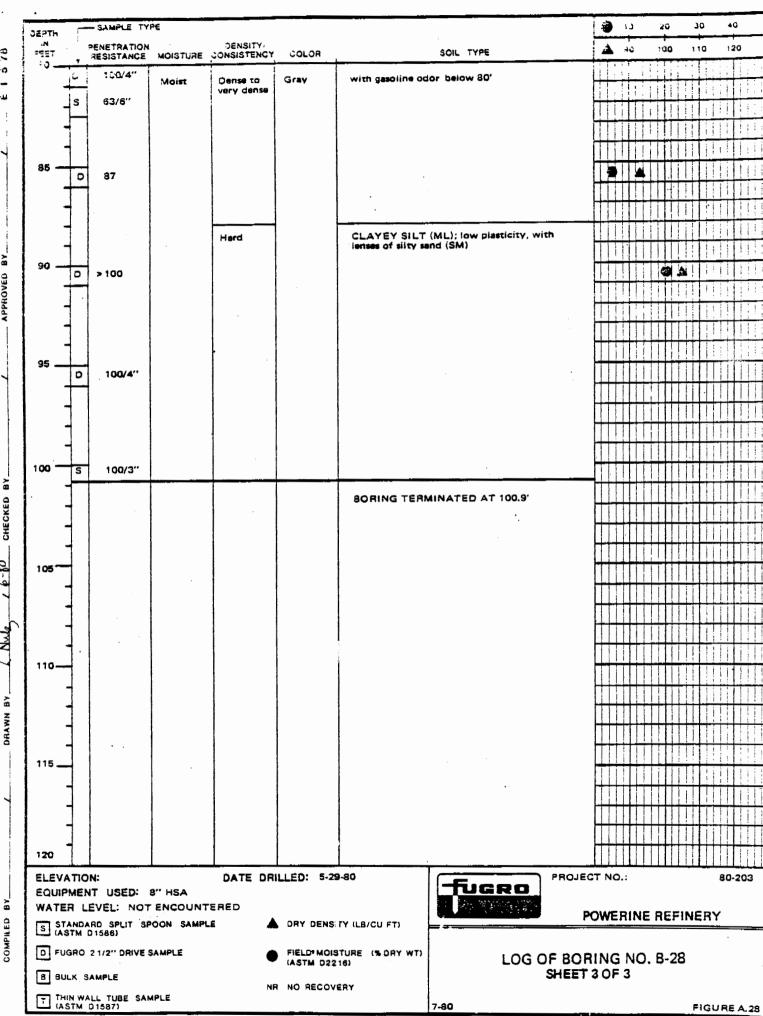
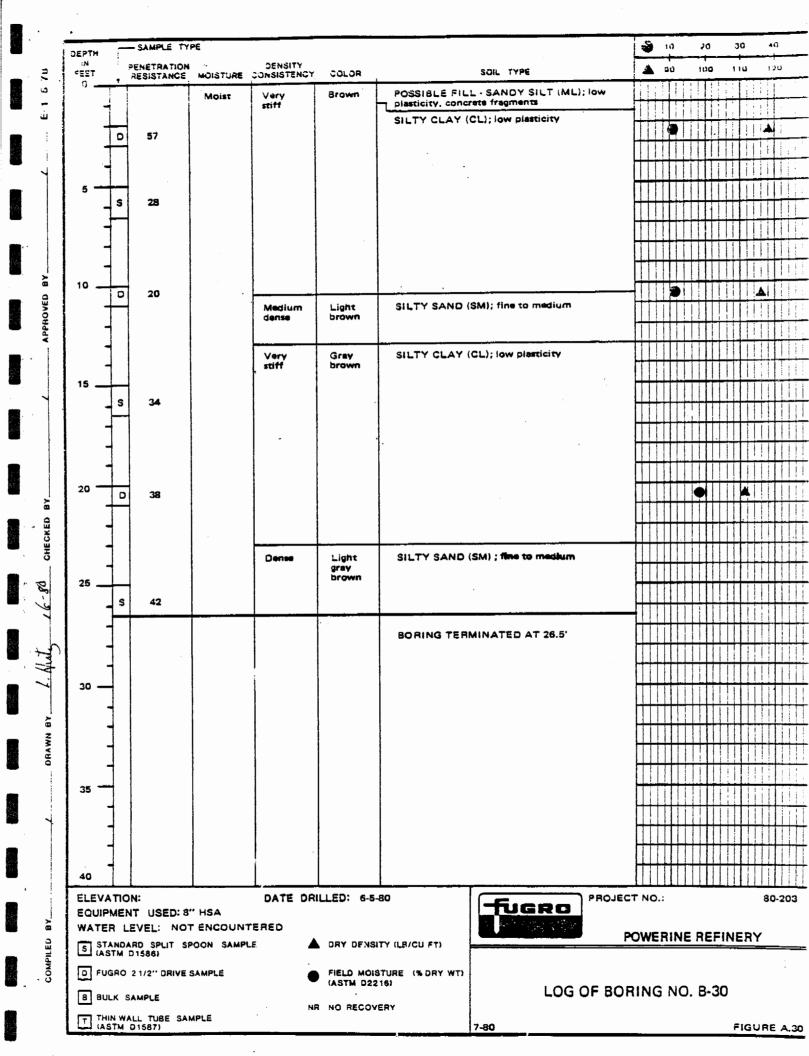


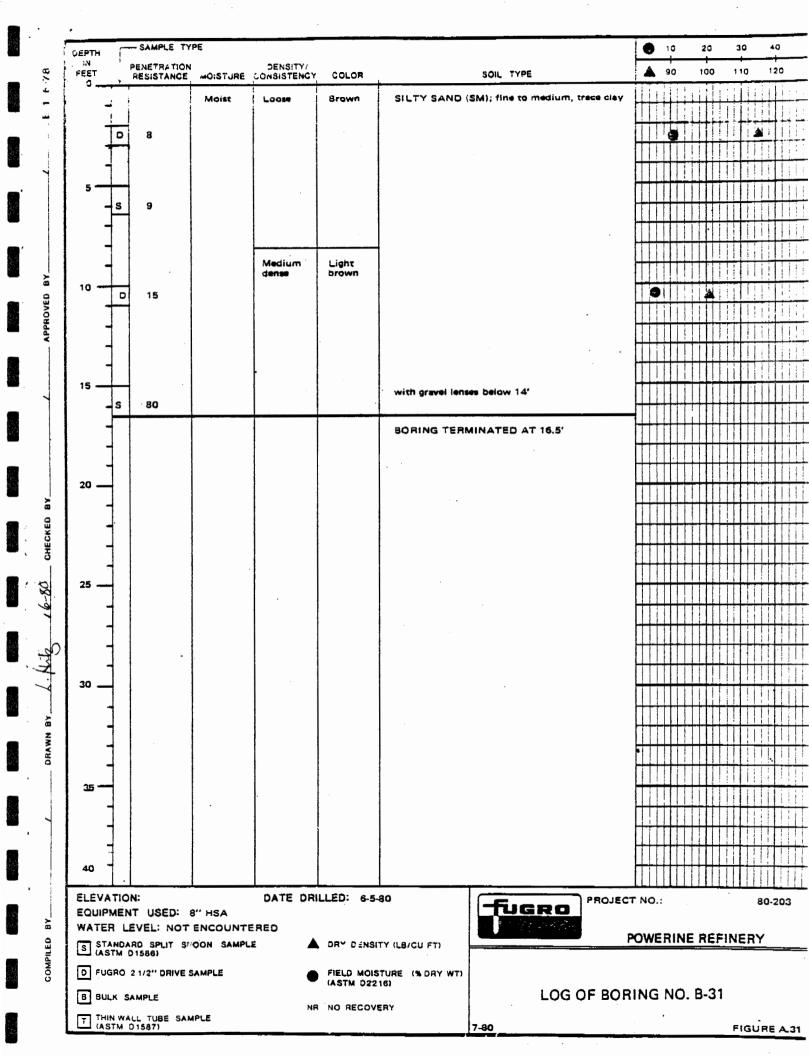
FIGURE A_28

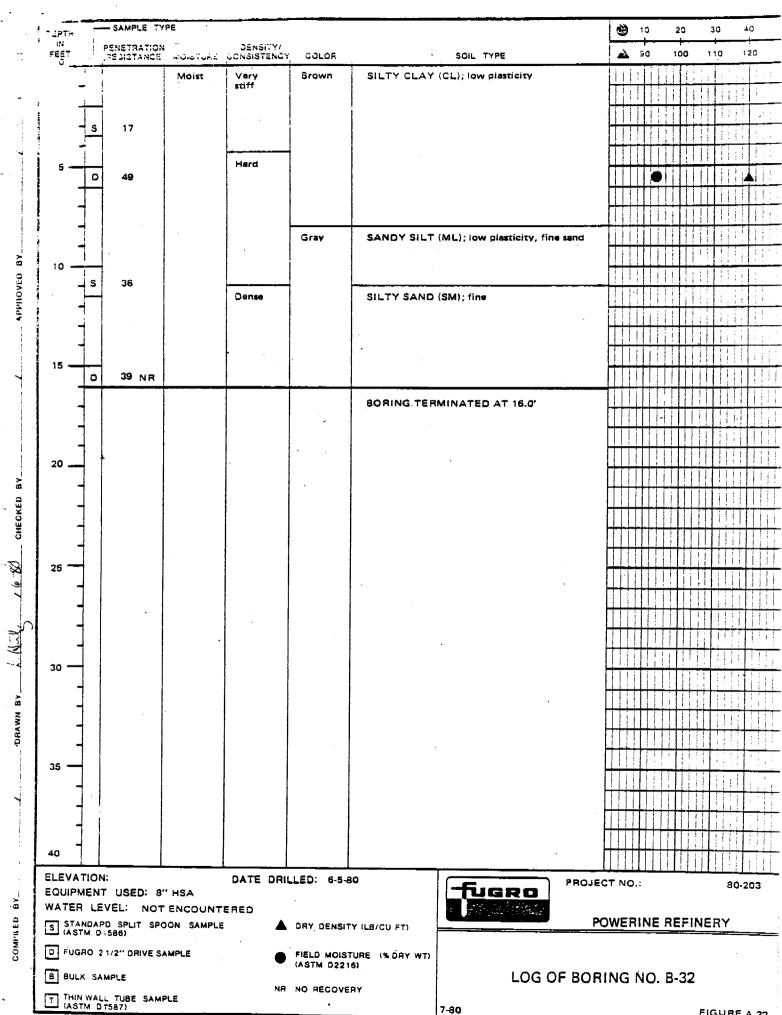


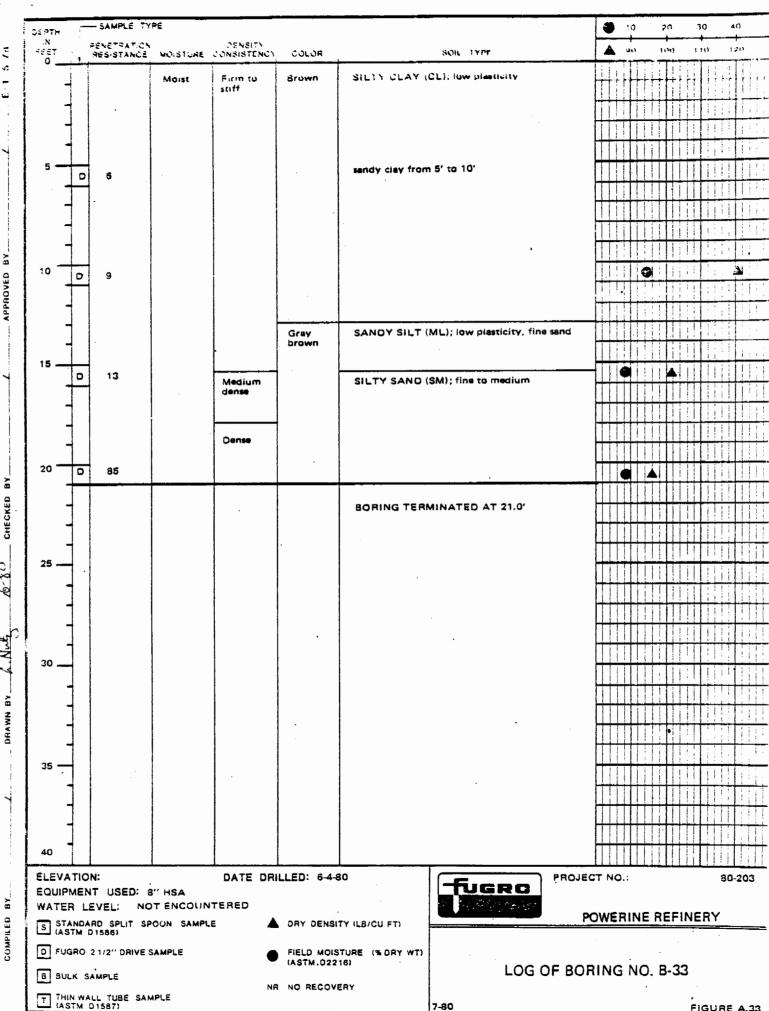


	_												-	_		_		
	PTH	SAMPLE T	YPE			•		4	11	3	:	20		30	<u>, </u>	^	40	
	IN EET	PENETRATIO	N MOISTURE	DENSITY/	COLOR	SQU	L TYPE		, u	a	ı	na		11	a	1	20	
	o	,	Moist			POSSIBLE FILL - SA plasticity, asphalt fre	NDY SILT (ML); lo gments	w			$\overline{+}$	\prod			$\overline{+}$	-	+	
	-	S 45		Hard	Brown	SILTY CLAY (CL); i	ow plasticity, with							***************************************	Ħ		T	Ī
	-							\coprod	Ш	1	$^{\parallel}$	\coprod	1	$\frac{\parallel}{\parallel}$	1 !	11	1	
	5								+	+	H	#	$^{+}$	H	H	11	$\frac{1}{1}$	i.
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	-			ļ					+	+	$\frac{11}{11}$	+	H	\dashv	11	11	+	11
				Firm to stiff	Light brown	SANDY SILT (ML);	low plasticity	H	+	\dagger	\mathbf{H}	\dagger	H	$\dagger \dagger$	+	11	1	<u> </u>
	-					<u> </u>			$\dagger \dagger$	+	Ħ	$\dagger \dagger$	H	\parallel	T	1	T	
1	15			Very dense	Gray	SILTY SAND (SM);	fine									II		
	_	S 50										\prod				П	Ш	11
	_								Щ	1	4	#	<u> </u>	$\frac{\parallel}{\parallel}$	4	1	4	\perp
	-			Hard	Mottled	SILTY CLAY (CL); I	low plasticity		+		11	+	1	\dashv	11	11	+	11
;	20 —	D 52			and gray			1		+		+		+	11	H		1
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		·		Very dense	Gray	SAND (SP); fine to n	nedium		Ш	4	\coprod	4	\coprod	$\downarrow \downarrow$	╬	Щ	\perp	4
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ľ	-	D 62							4	1	<u> </u>	#	1		+		1	4
	-					BORING TERMINA	TED AT 31.0'	H	$+\!\!+\!\!\!+\!\!\!\!+$	11	#	₩	1:	#	1	#	H	+
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_		TION:	- 	DATE DRI	LLED: 6-4-6	30		PROJECT	10.:		11	Ц.	L!	Ш	Ш	80)-2	03
W	VATE	MENT USED: R LEVEL: NO	T ENCOUNT				UGRO	POW	FR	iNi	= [₹FI	FII	NF	ים	,		
	S STA	NDARD SPLIT S TM D1588)	POON SAMPL	E 🎎	DRY DENSI	TY (LB/CJ FT)								_		_		
	o Fuc	80 2 1/2" DRIVE	SAMPLE	•	FIELD MOIS	TURE (% DRY WT)	1000	DOB411	٠.		_		_					
_	_	K SAMPLE		NR	NO RECOVE	ERY	LOG OF	RORING	۱۱ د	IO.	, В	-2	9					
Ī	I THI	WALL TUBE SA	MPLE			7-80								Fi	GL		= 4	.29





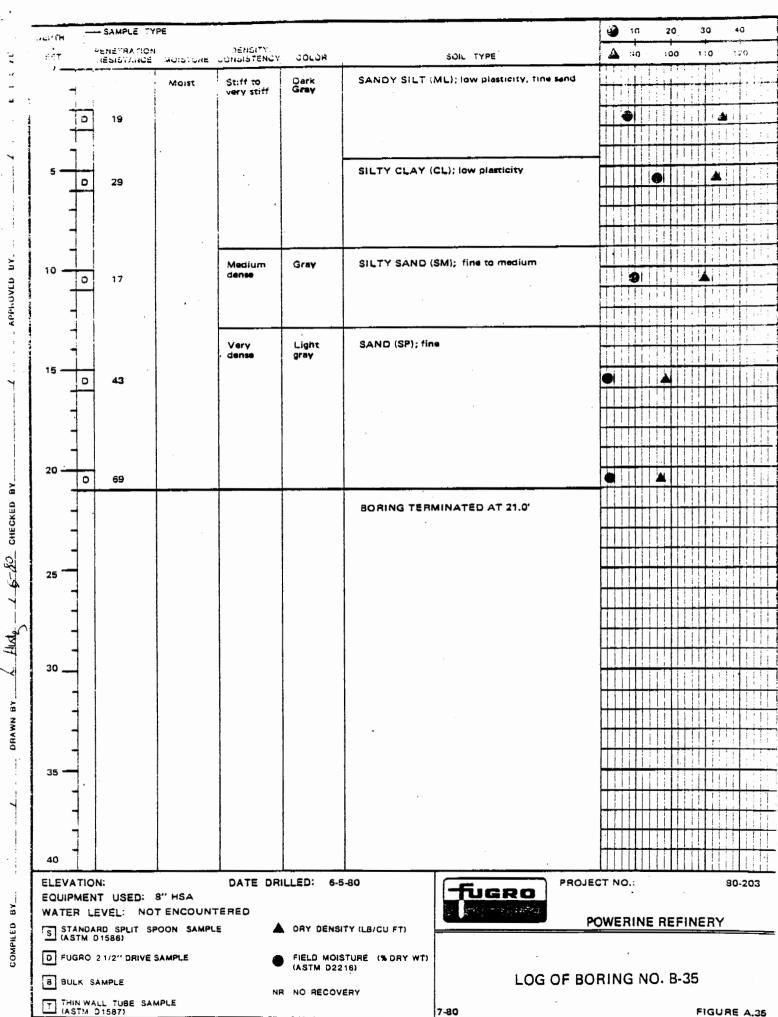




	SAMPLE	TYPE						•	10		20		10	40	
EPTH .N	PENETRATIO)N	DENSITY!					-	-+		-+-			120	
7227 O ——	RESISTANC	E MOISTURE	CONSISTENCY	COLOR		SOIL TYPE		-	90	, ; T.,	100	1 :	10	-	
_		Moist	Firm to	Brown	SILTY CLAY	(CL); low plasticity		1	1	1		##	1 1	#	
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	D 9 NR				sendy clay from	n 5' to 8'		Щ	\coprod	Ш	Ш	111			-
									4	Ш	11	111		1	
			-					Ш	4	111	111			11	-
					SANDY SILT	(ML); iow plasticity, fin	e sand	Щ	1	Ш	Щ			: ! !	+
10 —			<u>.</u>					1	11		111			-	-
	D 11					COLUMN STORY			1	0	4	<u>A</u> i		4	-
			Medium dense		SILTY SAND	(SM); Tine		Ш	11	! i :	4	;;	1 : .		-
								Ш.	\perp	 	Hi			-	
			Very dense	Gray	SAND (SP); fir	e to medium		\coprod		111	Щ		 	4	<u>:</u>
15 —								Щ	H	1:1	4			11	
	D 57 NR							Ш	Щ					Ш	1
								Ш	Ш		Щ				11
					gravel at 18' to	3/4"		Ш	Щ		Ш				11
								Щ	Щ	111	Щ	Ш		Ш	11
								Ш	Щ	Ш	Ш			1	11
	D 82									Ш	<u> </u>				Ш
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40															
	TION: MENT USED: R LEVEL: NO		DATE DRI	LLED: 6-4-	80	Tugeo	PROJECT	NO	,:				8	0-2	03
	NDARD SPLIT : TM D1536)			DRY DENSI	TY (LB/CU FT)		PC	WE	RII	NE F	≀EF	INE	RY		
	TM D1536) RO 21/2" DRIVE		•	FIELD MOIS	STURE (% DRY WT)	•									
B BUL	K SAMPLE		מע	(ASTM D22		LOG	OF BOR	INC	N	0.	B-3	4			

7-80

THIN WALL TUBE SAMPLE



אדרי	SAMPLE TY							•		10		20		30		-	10 1
.N -=€₹	PENETRATION RESISTANCE	MOISTURE	CENSITY/	COLOR		SOIL TYPE	·	A	, ;	90		100)	11	0	12	20
<u>-</u>			Stiff	Mottled	POSSIBLE FILL	L - SILTY CLAY (CL);	low		:	L				İ	1		1
4		Moist	3011	brown	plasticity	_ 5,5,, 55,, 194,		П			İ						
+								П		П				;			1
4	S 12									П	П						
4					[Ш	П	Π	П	П			1		
5-	D 12			_				H			\dagger				Δ	1 :	
+			Medium	Brown	SILTY SAND	SM); fine		Н	$\dagger \dagger$	\dagger	$^{+}$	1		il			
4		ŀ	dense					H	H	Ħ	Ħ	1			Ħ		П
4								Н	$\dagger \dagger$	Ħ							Г
4								Н	+	+		1		1	11		
;o <u> </u>		}						H	H	Ħ	; [1			1		
4	S 14		Stiff	-	SILTY CLAY	CL); low plasticity		H		H						: :	
4								H	+	+	+	+			11		H
-									+	+		+		+		1	۲
4			Medium dense	Light brown	SILTY SAND	SM); fine		H	11	+	-	+			1	+	Ť.
15	-							H	+	+		+					
4	D 14		1					H	H	1	Ħ	+		\mathbb{H}		11	H
4					BORING TERM	INATED AT16.0'		H	+	H	+	H		+	1		H
4								H	+	H	-	H			11		H
4								H	+	+		+			11		H
20								H		H	-				11		H
-								\mathbb{H}	11	H	+	-				11	H
_								\mathbb{H}		H				Щ		+	H
_						•			-	#	+	1				11	H
				,				\mathbb{H}	\parallel	H	11	1		Ш	11		H
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-								Щ	+	#	#	+			11		H
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30-								Ш	\parallel	H					1 1		Ļ
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40																	
ELEVA			DATE DR	LLED: 6-5	5-80		PROJEC	ΤN	0.:							80	-2
	MENT USED:		6BCD			-fuceo											
	R LEVEL: NOT			DEA UENG	HTY (LB/CU FT)		PC	<u>ow</u>	ER	IN	E	RE	FI	NE	RY	•	
~	TM D1586)	JUN SAMPL		56140	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.							-		_	_	_	=
S STA	THE D 13007																

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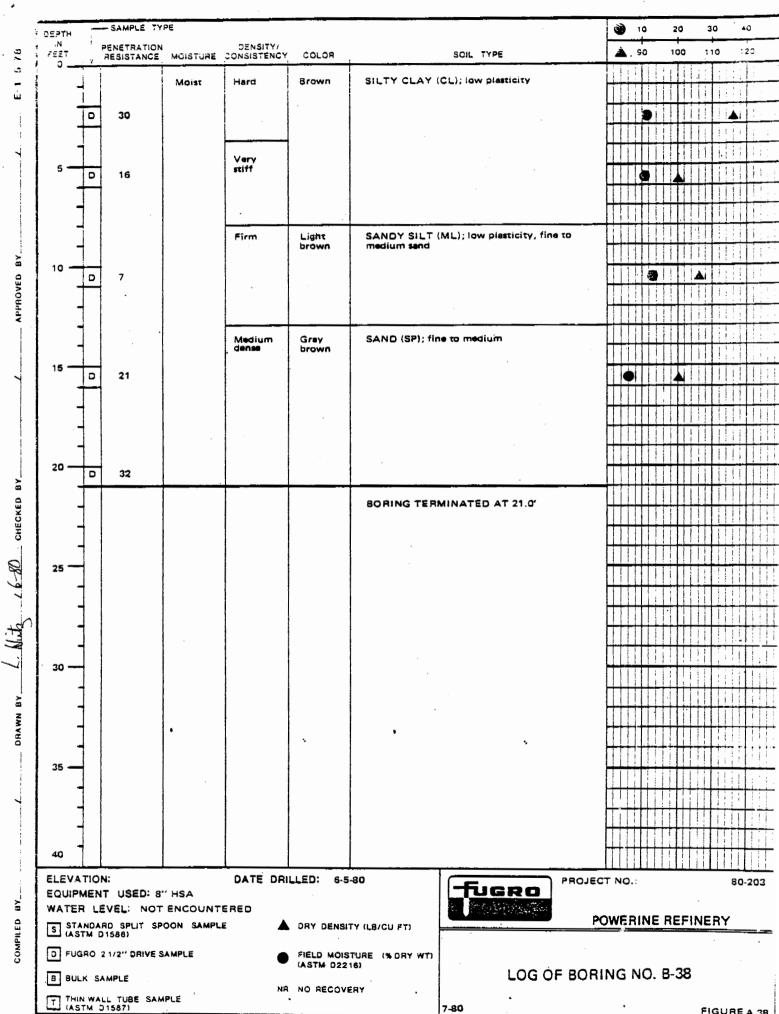
B BULK SAMPLE

THIN WALL TUBE SAMPLE (ASTM D1587)

FIGURE A.36

LOG OF BORING NO. B-36

DEPTH	SAMPLE TY	₽€						10	-	20	10	ı	40
FEST	PENETRATION RESISTANCE	MOISTURE	DENSITY/	COLOR	s	OIL TYPE	· ·	30	١	00	110	,	120
٥	,	Moist	Stiff	Dark	POSSIBLE FILL-S plasticity, asphalt f	ILTY CLAY (CL); IO	w III	\prod	П	Ш			\prod
7	.			brown	SANDY SILT (MI			Ш	Ш	Ш	Ш		Цi
	D 15				fine to medium se				Ш	Ш		<u> </u>	111
								Щ.	Ш	Щ.	<u> </u>	44	Щ.
]	·							44	Ш	Щ	Ш	Щ	Щ
5	D 14			Brown	SILTY CLAY (CL)	· low plasticity			Щ	Ш	Ш.		
						,,,,,,,,		#	#	##	Щ	 	#
								#	111	#	#	<u> </u>	
4								#	Ш	₩	#	111	111
10 —								#	<u> </u>	#			#
-	D 16							#	3	Н	- 2	4 :	
_								#	+++	 	+++	<u> </u>	+
-								$+\!\!\!\!+\!\!\!\!+$	1	#	11		
-			Medium dense	Gray brown	SAND (SP); fine			₩	H	₩			+-
15								₩	++	₩	#	+	
_	D 27					<u> </u>		₩	₩	₩	╬	+++	
_					BORING TERMIN	ATED AT 16.0'		₩	++	₩		₩	
_								₩	₩	₩	++	₩	1 1
-								₩	╁┼	₩	₩	₩	H
20 —							 	₩	₩	╁┼	₩	11:	
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-								₩	₩	₩	#	111	H
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25 —								+++	H	 	++		\forall
-							 	H	H	H	\mathbf{H}		
-							1	†††	H	H	++	\mathbf{H}	
-								HT	#	$\dagger\dagger$	+		
1				,				$\parallel \parallel$		H	$\dagger \dagger \dagger$		
30 —								\prod	H	\prod	$\forall \dagger$		
-							<u> </u>	$\dagger \dagger \dagger$	Ħ	H	$\dagger \dagger$	\prod	
-								\prod	\prod	$\dagger \dagger \dagger$	$\dagger \dagger$		
-				. :				\prod		\prod	\prod		
-								\prod		\prod	\prod		T
35 —				:						П	\prod		
								\prod	П	\prod	Ш	П	
										\prod_{i}			П
								\coprod	Ш		\prod		\prod
40								Ш					\prod
	TION: MENT USED: 8 LEVEL: NOT			LLED: 6-5	80	TUGRO	PROJECT N						0-20
	NOARD SPLIT SP			DRY DENSI	TY (LB/CU FT)		POWE	RIN	E R	EF	NE!	RY	
_	RO 2 1/2" DRIVE S				TURE (% DRY WT)								
B BUL	K SAMPLE		•	(ASTM D22		LOG O	F BORING	NC). 8	-37	,		
	WALL TUBE SAM		NR	NO RECOVE	ERY								



10-80

FIGURE A-11

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BY

B BULK SAMPLE

THIN WALL TUBE SAMPLE

FIGURE A-12

A MANAGEMENT OF THE PARTY OF TH

THIN WALL TUBE SAMPLE (ASTM D1587)

- SAMPLE TYPE 10 20 30 40 DEPTH DENSITY/
MOISTURE CONSISTENCY PENETRATION FEET 90 100 110 120 COLOR SOIL TYPE RESISTANCE 0 Stiff SILTY CLAY (CL), medium plasticity, Dark Moist contaminated with oil gray 22 Firm Б 10 10 Dry Dense Light SILTY SAND (SM-ML), very fine sand, nongray plastic s 45 15 SANDY CLAY (CL), medium plasticity Slightly Hard moist 55 D 20 Moist Very Light SILTY SAND (SM), fine dense brown \$ 75 25 Dark CLAYEY SAND (SC), low plasticity, fine gray 68 D 30 4 Very Dark SANDY CLAY (CL), medium plastic stiff brown 28 40 40 ELEVATION: DATE DRILLED: 9-2-80 PROJECT NO .: 80-241 JERC EQUIPMENT USED: 8' HOLLOW STEM AUGER WATER LEVEL: NOT ENCOUNTERED POWERINE REFINERY S STANDARD SPLIT SPOON SAMPLE A DRY DENSITY (LB/CU FT) D FUGRO 2 1/2" DRIVE SAMPLE FIELD MOISTURE (% DRY WT)

(ASTM D2216)

10-80

NR NO RECOVERY

LOG OF BORING NO. C-3

(SHEET 1 OF 2)

FIGURE A 13

B BULK SAMPLE

THIN WALL TUBE SAMPLE (ASTM D1587)

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В

(ASTM 02216)

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NR NO RECOVERY

(SHEET 2 OF 2)

FIGURE A-13

B BULK SAMPLE

THIN WALL TUBE SAMPLE (ASTM 01587)

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FIGURE A-15

THIN WALL TUBE SAMPLE (ASTM 01587)

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